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Medical News Letter

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MEDICAL NEWS LETTER

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Policy

The U.S. Navy Medical News Letter is basically an official Medical Department publication inviting the attention of officers of the Medical Department of the Regular Navy and Naval Reserve to timely up-to-date items of official and professional interest relative to medicine, dentistry, and allied sciences. The amount of information used is only that necessary to inform adequately officers of the Medical Department of the existence and source of such information. The items used are neither intended to be, nor are they, susceptible to use by any officer as a substitute for any item or article, in its original form. All readers of the News Letter are urged to obtain the original of those items of particular interest to the individual.

Change of Address

Please forward changes of address for the News Letter to Editor: Bureau of Medicine and Surgery, Department of the Navy, Washington, D.C. 20390 (Code 18), giving full name, rank, corps, old and new addresses, and zip code.

FRONT COVER: SUBMARINE MEDICAL RESEARCH LABORATORY. The Submarine Medical Research Laboratory which was established on 25 June 1946 at Groton, Connecticut, is now a part of the Submarine Medical Center, and is under the Command of the Bureau of Medicine and Surgery. Its mission is to conduct medical research and training of medical personnel in the field of submarine, shipboard and diving medicine. SMRL has staff and facilities to carry on basic and applied physiological and psychological research pertinent to its mission, and has divisions for the study of auditory problems, dentistry, human factors engineering, personnel assessment, physiology and vision. Medical investigative services have been furnished the Commander, Submarine Force, Atlantic, and other submarine activities in the New London, Connecticut area. In 1963 the SMRL developed the Stucke Hood which divers employed in making simulated escapes from the 50-foot deep escape training tank, using the "free breathing buoyant ascent" escape method. Recent significant research efforts include physiological studies that demonstrate the feasibility of saturation diving, development of new decompression schedules, definition of the changes brought in the special senses by underwater environment, and investigations covering the impact of artificial atmosphere on body physiology. The hyperbaric chamber, which makes use of oxygen under high pressure to treat a variety of disease conditions, has been developed, and a curriculum has been formed for use in teaching nurses to act as hyperbaric chamber assistants. By maintaining a high standard of research excellence the Laboratory has demonstrated repeatedly that the results of research can be applied to operational problems. It will continue to meet the challenges and the changes of the Navy's expanding underwater operations in the years to come.

The issuance of this publication approved by the Secretary of the Navy on 4 May 1964.

THE CLINICAL PICTURE OF LEPTOSPIROSIS IN AMERICAN SOLDIERS IN VIETNAM

LTC George L. Allen, MC USA, CPT David R. Weber, MC USA, ***
*LTC Philip K. Russell, MC USA,*** Milit Med 133(4):275–280,*
April 1968.

The widespread presence of leptospira-carrying mammalian hosts, both domestic and wild, throughout the world, especially in the rural areas, should make leptospirosis a common disease; particularly the milder form associated with non-specific symptoms and unassociated with jaundice and the renal complications of classical Weil's disease. However, isolation of the causative organism is often difficult as well as the identification of the specific leptospira type. With this large natural animal reservoir of leptospirosis present and the clinical infection frequently encountered by the British in Malaya and the French in Indochina, the occurrence in American soldiers in the Republic of Vietnam would be expected. However, leptospirosis was confirmed in only one case between April and August 1966 in a study of 110 febrile illnesses at the 93rd Evacuation Hospital. As a result of a continued clinical search and screening of undiagnosed fevers at the same hospital from September 1966 through February 1967, 18 additional cases of leptospirosis were diagnosed. The benign, non-specific, self-limited character of this illness with limited morbidity suggested that leptospirosis was occurring more frequently than clinically recognized. Therefore, an evaluation of the clinical picture of leptospirosis encountered in American soldiers in Vietnam is described.

Materials and Methods

Patients included in this series were admitted to the 93rd Evacuation Hospital, Long Binh, Republic of Vietnam, for the treatment of febrile illnesses. During the period of the study, an attempt was being made to establish an etiologic diagnosis in all cases admitted with febrile illnesses by means of serologic methods in which a specific clinical diagnosis could not be established.

The diagnosis of leptospirosis in the 19 cases reported herein was established by demonstration of a rising antibody titer using the leptospirosis hemolytic test. In each case, a rise in titer was also demonstrated to one or more leptospiral antigens using the micro-agglutination test. Serologic tests for dengue and chikungunya viruses (hemagglutination-inhibition tests) and scrub typhus (indirect fluorescent antibody test) were negative in all 19 patients. Limited clinical summaries were available on all 19 patients and complete hospital records were available on 15 of the patients.

Case Reports

Representative cases are reported in the following summaries to show the typical clinical manifestations. The remaining cases were similar to those described; therefore, they have been omitted.

Case 3. This 22-year-old infantryman was admitted on September 27, 1966 with a three-day history of fever, chills and backache and a one-day history of severe headache, abdominal cramps and diarrhea. He had recently been on combat jungle operations. Physical examination was not remarkable except for some hepatic percussion tenderness. Laboratory studies revealed a blood leukocyte count to be 10,300 with a differential that included 81 percent neutrophiles and 19 percent lymphocytes. The hematocrit was 44 percent. Fourteen malaria smears were done during the first five days following admission and were all negative. An SGOT was 44 units. The urinalysis was normal. During hospitalization, the patient continued to have nausea, some diarrhea, and a headache severe enough to require codeine for control. He received only supportive care. His fever persisted until the fifth

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hospital day after which he felt well and was discharged to full duty.

Case 4. This 19-year-old infantryman was admitted on September 17, 1966 with a two-day history of chills, fever, lethargy and headache. He had recently been on combat operations in flat jungle terrain. Physical examination revealed conjunctival suffusion, scattered cervical nodes and some mild hepatic percussion tenderness. Laboratory studies showed an initial leukocyte count of 11,200 with 85 percent neutrophiles, 8 percent lymphocytes and 7 percent monocytes. The hematocrit was 45 percent. During the first several days of admission 12 malaria smears were negative. The urinalysis was normal. Headache severe enough to require codeine for control was a major complaint until the sixth hospital day. Tetracycline was begun on the fourth hospital day because of a presumptive diagnosis of scrub typhus. He became afebrile on the fourth hospital day and had an unremarkable recovery.

Case 10. This 21-year-old infantryman was admitted on November 22, 1966 with a five-day history of headache, fever, cough and malaise. He also had recently been in the jungle on combat operations. Physical examination revealed only a few palatal petechiae and minimal cervical and axillary lymphadenopathy. Laboratory studies showed a leukocyte count of 7,900 with 63 percent neutrophiles, 31 percent lymphocytes, 3 percent monocytes and 3 percent eosinophiles. The hematocrit was 47 percent and six malaria smears were negative. The urinalysis was normal. An SGOT was 88 units and the alkaline phosphatase was three Bodansky units. Headache continued to be a major complaint during hospitalization requiring large amounts of Darvon for control. Tetracycline was given for the presumed diagnosis of scrub typhus. The patient became afebrile on the third hospital day and had an uneventful recovery.

Case 11. This 23-year-old infantryman was in the jungles and was admitted on December 1, 1966 with a four-day history of fever to 104 degrees F., backache, calf muscle myalgia and mild headache. Physical examination revealed marked conjunctival suffusion, hepatic percussion tenderness and some costovertebral angle tenderness. The laboratory studies showed a blood leukocyte count to be 4,600 with 5 percent neutrophiles, 30 percent lymphocytes, 2 percent monocytes and 13 percent eosinophiles. The hematocrit was 46 percent. Malaria smears were negative on 12 occasions. The urinalysis was normal. The SGOT was 30 units and the alkaline phosphatase was three Bodansky units. The patient had been started on tetracycline before admission and this was continued. He was given additional supportive treatment and became afebrile after admission and remained so. He had an uneventful convalescence.

Case 17. A 21-year-old infantry scout was admitted January 13, 1967 with a 72-hour history of weakness of the lower extremities followed by a severe headache, slight nausea and finally generalized myalgia. He had been wading in swamps and had been in water as high as his chest. Physical examination revealed conjunctival suffusion and bilateral upper quadrant tenderness without organomegaly. The laboratory studies revealed a blood leukocyte count to be 11,500 with 51 percent neutrophiles, 36 percent lymphocytes, 11 percent monocytes and 1 percent each eosinophiles and basophiles. Hematocrit was 42 percent and malaria smears were negative on 12 occasions. Liver function studies were not obtained. Severe headache remained a problem throughout hospitalization. Tetracycline was instituted on the second hospital day without alteration of symptoms or fever curve. The patient gradually became afebrile and asymptomatic over a week and had an uneventful recovery.

Case Analysis

The age of the patients ranged from 19 to 38 years, and 16 of them were under 24 years of age. All patients came from units actively engaged in combat or in forward combat support. The terrain was described as "jungle" or "swamp" in 80 percent of cases.

Thirteen of the patients were admitted to the 93rd Evacuation Hospital on or before their third day of clinical illness. The total duration of fever ranged from three to ten days but 15 of the patients were febrile in excess of six days. Their peak temperature ranged from less than 102 degrees F. to 106 degrees F. It occurred between 103 degrees F. and 104 degrees F. in nine cases; between 104 degrees F. and 105 degrees F. in four cases, and was above 105 degrees F. in two cases. No typical fever curve was observed.

The attending physician was asked to list those symptoms which the patient considered "important" or "significant" in his illness. No effort was made to limit this number of complaints nor was the patient encouraged to describe every symptom (Table 1).

Seven patients listed four different symptoms while five patients listed three. While headache was

TABLE 1.—*Clinical Features*

(19 patients)	
Fever	17
Headache	12
Chills	11
Backache	9
Nausea/vomit	2
Lethargy/malaise	2
Abdominal complaint	2
Dizziness	2

considered "significant" in only two-thirds of the cases the degree of its severity was impressive. Of the 15 patients whose complete clinical charts were available, 11 described severe headaches in the initial interview while only one specifically denied headache. Headache was frequently of such severity during hospitalization that codeine was required for relief. Myalgia or backache was present as a distinctive feature in only nine of the patients (but no muscle biopsies were performed). However, it was not of the severity usually reported. The fact that all patients had been on recent jungle operations or exposed to rice paddies in the delta area is of epidemiologic interest; however, no specific terrain features or running jungle streams could be identified.

In examining the physical findings (Table 2) and excluding elevated temperature, which was universally present, conjunctival suffusion and hepatic punch tenderness occurred most frequently. In no case was the liver felt to be enlarged; however, splenic tenderness was the next most frequent finding. A palpable spleen was present in one patient. Additional common findings included diffuse generalized abdominal tenderness and cervical lymphadenopathy. Other features were not frequent enough to be of any value in suggesting the diagnosis. No patient demonstrated icterus or cutaneous eruptions.

Seven patients each displayed two abnormal physical findings, while five had three and an additional five had only one. A single patient had no significant physical findings.

TABLE 2.—*Physical Findings*

Conjunctival suffusion	9
Hepatic tenderness	9
Splenic tenderness (both R and LUQ tenderness)—4	6
Adenopathy	4
Muscle tenderness	3
Periumbilical tenderness	2
Petechiae (palate-1, feet-1)	2
Pharyngitis	1
Palpable spleen	1
Flush of face	1
No abnormal findings	1

Laboratory Findings

Every patient had a hematocrit, leukocyte count, a differential count, urinalysis and malaria smear performed in addition to the serologic tests for leptospirosis, dengue, scrub typhus, Japanese B encephalitis and chikungunya. Hematocrits and multiple malaria smears were normal or negative in each case. Occasional urinalysis revealed transient minimal proteinuria. The admission leukocyte counts ranged from 2,800 to 15,200 cubic mm., with a mean of 8,850. However, 85 percent of patients had at least one determination greater than 9,000 cubic mm. when initially hospitalized or on repeat examinations. The percentage of neutrophiles ranged from 36 to 89, but was greater than 70 percent in half of the total determinations, and was greater than 70 percent on at least one determination in 80 percent of patients. This fluctuating leukocyte count was expected.

Since other laboratory studies were performed at the discretion of the attending physician, they were not uniform. However, the SGOT was determined a total of 16 times in ten patients and was elevated (above 50 units) on eight occasions in five patients. The SGOT values ranged from 16 to 100 units with a mean of 64 units. Bilirubin and serum alkaline phosphatase values were normal on all occasions when tested. In prior reports a higher percentage of abnormal liver function studies have been described.

The results of the serological testing are shown in Table 3. Though inoculation of blood specimens into Fletcher's media was done in strongly suspected cases, no organisms were recovered. Antibodies

TABLE 3.—*Results of Leptospirosis Hemolytic Test*

Case #	Study Deller & Russell	Acute 1: (Reciprocal of Titer)	Convalescent 1: (Reciprocal of Titer)
1	(3)		
2	58	40	2560
3	69	40	5120
4	138	40	2560
5	187	40	5120
6	197	160	10,240
7	219	40	640
8	244	40	1280
9	258	320	5120
10	275	40	640
11	297	320	2560
12	309	40	640
13	334	40	10,240
14	338	40	1280
15	340	40	5120
16	343	1280	5120
17	348	40	2560
18	373	40	640
19	384	40	1280

can nearly always be demonstrated in low titer by the seventh or eighth day of illness and are highly specific. Convalescent titers may reach levels of 1/30,000.

The admission and disposition diagnosis for the 18 new cases are compared in Table 4. The clinical impression of the attending physician was the determining factor in each case, and as previously noted the true diagnosis is frequently overlooked.

Discussion

Leptospirosis as seen at the 93rd Evacuation Hospital, Long Binh, Republic of Vietnam was a benign, self-limited disease, most frequently confused, on a clinical basis, with scrub typhus or dengue fever. In most cases the true diagnosis was not made clinically though it was included in the differential. Malaria was considered a distinct possibility in all cases. The severe manifestations usually associated with leptospirosis by many physicians were not seen. Although fever was generally above 103 degrees F. and frequently over 104 degrees F., no distinctive pattern could be established. The total duration of fever varied from six to nine days.

A benign form of leptospirosis with an incubation period of five to 14 days is well known but needs reemphasis. This mild form is known by many names, most common of which are swamp fever, pseudodengue, autumn fever, Fort Bragg fever, seven-day fever and Eastern Weil's Disease. A benign course, of short duration of fever, and a favorable outcome, with the absence of icterus, renal, and hemorrhagic characteristics of Weil's disease are expected. Meningeal or central nervous system symptoms other than headache are common, but were not present in our cases. Conjunctival suffusion was common, and in combination with severe headache, hepatic percussion tenderness, and marked myalgia provided the most suggestive clue to diagnosis. Other commonly described features were present in occasional patients but were not constant enough to be considered reliable findings.

Although the true diagnosis was suspected in several cases during the acute illness, no therapy was specifically directed toward leptospirosis. Several of the patients did receive tetracycline for a presumptive diagnosis of scrub typhus, but their clinical course was not significantly different from those patients who received only symptomatic care. No serious complications were encountered. The benignity of the disease in all of our patients was supported by the clinical course, full recovery and available laboratory studies.

The British and Australians in their Malayan military operation in the 1950's encountered leptospirosis as a generally self-limited febrile disease, although an occasional death occurred. The general clinical syndrome that was found was exactly as we have described. Hemorrhagic and icteric phenomena were uncommon. They found that some urinary abnormalities manifested by the appearance of proteinuria, cylinduria and an increase in cellular elements were common. Frequently encountered species were L. pyrogenes, L. hebdomedia, L. Balavia, L. canicola, L. grippothyphosa, L. autumnalis and L. celledoni. L. ictero-hemorrhagiae was present and along with L. australis B accounted for several fatalities.

In Malaya, patients contracted leptospirosis in a variety of environments but most frequent contact was in the primary forests. The case incidence was proportional to the amount of time spent on jungle operations. Generally, any illness characterized by headache, myalgia, conjunctival injection and gastrointestinal symptoms in the presence of urinary abnormalities warranted the diagnosis of leptospirosis until proven otherwise.

In Indochina, The French found that leptospirosis was endemic in the delta areas. Military operation in marshy zones and rice paddies had a high incidence of infection. It was a serious problem in the French prisoners of the Viet Minh. Case incidence was high at the end of the dry season during the months of February through April. This was attributed to the fact that as the water level dropped, leaving numerous pools with warm mud and a shallow covering of water, it provided an environment highly favorable for the spirochetes. Nothing more than contact with the mud was needed for contracting leptospirosis. The French found essentially the same species of leptospira that were found in Malaya.

The minimal contact necessary and the benign nature of the disease was well described by Heath et al. and Sanford in the United States, and they speculated that due to the self-limited nature of the disease many cases masqueraded as "flu" or other viral illness. In many cases there was a paucity of laboratory findings; blood leukocyte counts were quite variable and most cases were proven only by serologic methods. A four-fold or greater rise in antibody titer in paired acute and convalescent serum is regarded as diagnostic. However, in an appreciable portion of cases a demonstrable antibody or rise in antibody is not present, so a definite diagnosis may not be established. However, it may

TABLE 4.—*Admissions and Discharge Diagnosis*
(Number of Cases)

	Admission	Discharge
FUO	13	10
Leptospirosis	2	4
Dengue	1	3
Scrub Typhus	2	1

be strongly suspected with a low titer, if residual titers from prior infections can be excluded.

Although a significant antibody rise was demonstrated in all patients reported, definite serotypes of leptospira could not be established, since the immune response is ordinarily insufficiently specific to identify the many serotypes of infecting microorganisms. Precise identification depends upon serologically typing the cultured leptospira, and adds nothing to the diagnosis and management of the disease.

Summary

Eighteen additional cases of leptospirosis recently diagnosed at the 93rd Evacuation Hospital are reported. These patients presented as undiagnosed fevers with a clinical syndrome characteristic of the benign form of leptospirosis and recovered uneventfully within eight to twelve days. They had all been on jungle operations. Each case was confirmed serologically.

The presence of leptospirosis in the Republic of Vietnam is probably more common than is reported. Alert physicians who fully evaluate the non-specific symptom complex of headache, myalgia, conjunctival suffusion and gastrointestinal complaints should be rewarded by making the clinical diagnosis with increasing frequency.

(The omitted figures and references may be seen in the original article.)

RABIES: PRESENT ATTITUDES

Ronald C. Jones, MD, The University of Texas Southwestern Medical School at Dallas, Postgrad Med 43(3):141–147, March 1968.

The author presents the scope of the rabies problem, how to care for wounds, what reactions occur with vaccines and antiserums, how to immunize persons in high-risk occupations, and what treatment schedules should be followed after mild and severe exposures.

There are an estimated 30 million dogs, 35 million cats, and 20 million caged birds in the United States, and numbers are rapidly increasing. About two million persons are bitten by animals yearly, a half million by dogs. In 1964, 4,784 reports of animal rabies (75 percent in wildlife species) were confirmed in the United States. Probably less than 10 percent of cases are reported. There were about 100 instances of rabid bats biting humans. Persons bitten by bats in known infected areas should receive antirabies treatment. Mere inhalation of rabies virus can infect animals and man.

The diagnosis of rabies is made by demonstration of Negri bodies in the cytoplasm of the nerve cells. False negative results of tests to demonstrate these bodies have occurred, and a human death from rabies has been ascribed thereto. The fluorescent antibody test as described by Goldwasser and associates appears to be more accurate than Seller's staining method, and a diagnosis may be obtained in a few hours. The intracerebral inoculation of mice, coupled with the microscopic examination of brain tissue for Negri bodies, is still one of the most useful tests in the laboratory diagnosis of rabies and should be used whenever humans have been bitten by suspect animals and results of the fluorescent antibody test are negative.

Most animal bites of human beings are caused by dogs, and in most instances it is possible to observe the biting animal for the development of rabies. Circumstances surrounding the attack frequently give vital information as to whether or not vaccine is indicated.

The dog that bites without apparent cause or provocation should be considered rabid. Since the rabies vaccine used in dogs is not 100 percent effective, the fact that the dog has been vaccinated should be ignored.

Rabid dogs exhibit purposeless movements with snapping, drooling and vocal cord paralysis. Death

usually occurs in two to five days. The course of rabies is similar in man. The human victim has prodromal symptoms for two to four days before the excitement stage is reached. Pain in the region of the bite is the most important early symptom. The outstanding clinical symptom of rabies is related to swallowing.

Immediate Local Care

The immediate local care of an animal bite may make the difference between life and death. Free bleeding from the wound should be encouraged. In animals studied by Dean, Baer and Thompson, benzalkonium chloride (ZEPHIRAN®), IVORY® soap, and antirabies serum used singly or in combination reduced the rabies "take" to 10 percent or even less as compared with 90 to 95 percent in control animals and were most effective when applied to wounds within three to six hours. Local care of an animal bite should consist of thorough irrigation with copious amounts of saline solution, cleansing with a 20 percent soap solution, swabbing with a 1 or 2 percent solution of benzalkonium chloride, debridement and administration of antibiotics and tetanus toxoid. In wounds that permit adequate application, benzalkonium chloride or soap, or both, is considered at least as effective as, and probably more effective than, fuming nitric acid. All soap should be removed before application of quaternary ammonium compounds because soap neutralizes the activity of such compounds. The antibiotics presently available do not affect rabies virus but may be helpful in preventing bacterial infection. Antiserum applied topically is remarkably effective in preventing rabies in experimental animals. Immediate suturing of the wound is not generally advised since it may contribute to the development of rabies, but suturing may be done in dog bites if exposure to rabies is unlikely.

Side Reactions to Vaccine and Antiserum

Rabies vaccine should not be given unless there is a definite indication for its use. Duck-embryo rabies vaccine is a killed-virus vaccine prepared from fixed virus. Local reactions to duck-embryo rabies vaccine are frequent. Generalized reactions are occasionally observed. Neurologic reactions of the type associated with use of vaccine of nerve-tissue origin are rare. Duck-embryo rabies vaccine has been widely used since it became available in 1957, and neurologic reactions have been reported in only five persons, all of whom recovered without permanent sequelae. No deaths have been attributed to its use.

Neurologic reactions to rabies vaccine of nerve-tissue origin are rare but constitute the principal hazard in its use. They occur in three main types: peripheral neuritis, the spinal form, and the cerebral form with acute encephalitis. Dorsolumbar paralysis may be either flaccid or spastic. Peripheral neuritis may involve facial, oculomotor, glossopharyngeal or vagal nerves. Neurologic reactions usually become apparent four days or more after antirabies treatment is started.

Antirabies serum is obtained from immunized horses and may be expected to produce side reactions in approximately 20 percent of persons.

Combined Antiserum-Vaccine Treatment Following Exposure

Although there is much controversy as to the indications for use of hyperimmune serum, vaccine and a combination of these agents, there is little doubt that all are highly beneficial when used as recommended by the Expert Committee on Rabies of WHO.

In experiments with hamsters and guinea pigs using antirabies serum and rabies vaccine separately and in combination, investigators found that vaccine alone invariably failed to protect laboratory animals. They concluded that antiserum seems to have definite value and recommended a single dose of antiserum combined with a course of vaccine following exposure to rabies.

Observations concerning the combined treatment of human subjects were also described by Koprowski, Van der Scheer and Black. A patient accidentally exposed to street virus in the laboratory was treated with antirabies serum within three hours and was then given a seven day course of Semple vaccine. Five other persons were observed who were given a seven day course of vaccine, but no antiserum, following exposure to rabies. The serum titer of neutralizing antibodies was determined daily in all instances. The patient who received the combined antiserum-vaccine treatment showed a definite level of antibodies in 24 hours, as indicated by the 1:50 minimal protective titer, and maintained a protective level of serologic immunity throughout the vaccination period, having the same titer 30 days after initiation of treatment. In contrast, the level of serologic immunity in the group given only a course of vaccine remained very low and the antibody response, if present, was very slow. The conclusion was drawn that antirabies concentrate in-

duces a quick immunologic response in contrast to rabies vaccine.

Hildreth cited two human deaths from rabies which represented failures of the combined therapy. In both instances antiserum was given on the third day following exposure and vaccine was started on the fourth day. These cases lend support to the observations of Koprowski, Van der Scheer and Black that the serum is best administered within 24 hours after exposure and must be given within 72 hours to be even partially effective. The effectiveness of antiserum also depends in part on the amount of virus inoculated and on the concentration of serum.

Habel ascribed the effectiveness of the combined therapy to prolongation of the incubation period by the antiserum. In the vaccine prophylaxis an effort is made to induce active immunity to a virus already in the body. Active immunization takes time. Probably the only reason why rabies vaccine is effective at all is the lengthy incubation period of this disease. Thus the combined therapy should give better results than either agent alone.

In August 1954, in an Iranian village, 29 persons were bitten by a rabid wolf in a few hours. Treatment was started 28 to 32 hours after exposure. The 18 patients with severe head wounds were divided into three groups; one group received one injection of hyperimmune serum plus phenolized vaccine for 21 days, the second group received two injections of serum (on the first and fifth days) plus vaccine for 21 days, and the third group received only a course of vaccine. The persons bitten on limbs and trunk received serum and vaccine or vaccine alone. There were no deaths in the group of patients with head wounds who received two injections of serum plus a course of vaccine. Of seven patients with head wounds receiving one injection of serum and a 21 day course of vaccine, one died. Of five head-injured persons receiving only vaccine, three died. All persons bitten on the limbs and trunk survived. Antibodies developed much earlier in those on combined therapy.

The Expert Committee on Rabies in their third report cited experimental work showing that one dose of serum reduced but did not completely suppress the antibody response to 14 daily doses of phenolized vaccine, whereas two doses of serum given on the first and fifth days of treatment did suppress the antigenicity of this vaccine schedule. It was concluded that if passive antibodies are maintained for too long a period by repeated doses of serum or if fewer than 14 doses of vaccine are given even after a single dose of serum, there is definite interference by the serum with the antigenicity of the vaccine. A detailed guide for treatment of rabies is shown.

The duck-embryo vaccine appears to offer an advantage over the nerve-tissue vaccine used previously in that the former contains minimal amounts of nerve tissue. Greenberg and Childress compared duck-embryo vaccine with nerve-tissue vaccine and showed that demonstrable antibody following the use of duck-embryo vaccine tends to develop somewhat earlier but that the titers tend to be lower.

When exposure to rabies is strongly suspected, hyperimmune serum should be injected around the wound after sensitivity testing has been done. The serum should be administered in a single dose of not less than 40 IU per kilogram of body weight inoculated intramuscularly in the buttocks, with a portion used whenever practical to infiltrate the tissues around the wound. A larger dose of 50 to 100 IU per kilogram should be given if the wound is extensive or on the head. It is presently recommended that serum of satisfactory potency be given on one occasion only and as early as possible following exposure. The use of serum should be accompanied by a 14 day course of vaccine. The dose of vaccine is now 2 cc of a 5 percent tissue emulsion given subcutaneously. A shorter course of vaccine is not recommended, since passive immunity induced by serum may limit response to vaccine. Two booster injections of vaccine (preferably not of nerve-tissue origin) should be given at 10 and 20 or more days following the last regularly scheduled injection, especially if antirabies serum has been administered.

Occasionally the incubation period of rabies in man is only 14 to 21 days. Experience indicates that rabies vaccine is most effective when given immediately after exposure and when the inoculation period exceeds 30 days. Human beings may contract rabies even though they have received 14 doses of duck-embryo vaccine, particularly when the incubation period is less than 30 days. No antibiotic or chemotherapeutic agent has been found to work against rabies. However, of the persons bitten by rabid animals and not given antirabies treatment, probably only 50 to 75 percent contract the disease. Approximately 40,000 to 60,000 people receive antirabies vaccine each year.

Immunization Before Exposure

The fourth report of the Expert Committee on Rabies includes the following observations based on studies of 400 persons:

WHO GUIDE FOR TREATMENT OF EXPOSURE TO RABIES

A. Local Treatment of Wounds Involving Possible Exposure to Rabies

(1) Recommended in all exposures.
(*a*) *First-aid treatment*
Immediate washing and flushing with soap and water, detergent or water alone (recommended procedure in all bite wounds including those unrelated to possible exposure to rabies).
(*b*) *Treatment by or under direction of a physician*
(i) Adequate cleansing of the wound.
(ii) Thorough treatment with 20% soap solution and/or the application of a quaternary ammonium compound or other substance of proven lethal effect on the rabies virus.[1]
(iii) Topical application of antirabies serum or its liquid or powdered globulin preparation (optional).
(iv) Administration, where indicated, of antitetanus procedures and of antibiotics and drugs to control infections other than rabies.
(v) Suturing of wound not advised.
(2) Additional local treatment for severe exposures only.
(*a*) Topical application of antirabies serum or its liquid or powdered globulin preparation.
(*b*) Infiltration of antirabies serum around the wound.

[1] Where soap has been used to clean wounds, all traces of it should be removed before the application of quaternary ammonium compounds because soap neutralizes the activity of such compounds.

B. Specific Systemic Treatment

Nature of exposure	Status of biting animal (irrespective of whether vaccinated or not)		Recommended treatment
	At time of exposure	During observation period of ten days	
I. No lesions; indirect contact	Rabid	—	None
II. Licks:			
(1) unabraded skin	Rabid	—	
(2) abraded skin, scratches and unabraded or abraded mucosa	(*a*) healthy	Clinical signs of rabies or proven rabid (laboratory)	Start vaccine[1] at first signs of rabies in the biting animal
	(*b*) signs suggestive of rabies	Healthy	Start vaccine[1] immediately; stop treatment if animal is normal on fifth day after exposure
	(*c*) rabid, escaped, killed or unknown	—	Start vaccine[1] immediately
III. Bites:			
(1) mild exposure	(*a*) healthy	Clinical signs of rabies or proven rabid (laboratory)	Start vaccine[1,2] at first signs of rabies in the biting animal
	(*b*) signs suggestive of rabies	Healthy	Start vaccine[1] immediately; stop treatment if animal is normal on fifth day after exposure
	(*c*) rabid, escaped, killed or unknown	—	Starte vaccine[1,2] immediately
	(*d*) wild (wolf, jackal, fox, bat, etc.)	—	Serum[2] immediately, followed by a course of vaccine[1]
(2) severe exposure (multiple, or face, head, finger or neck bites)	(*a*) healthy	Clinical signs of rabies or proven rabid (laboratory)	Serum[2] immediately; start vaccine[1] at first sign of rabies in the biting animal
	(*b*) signs suggestive of rabies	Healthy	Serum[2] immediately, followed by vaccine; vaccine may be stopped if animal is normal on fifth day after exposure
	(*c*) rabid, escaped, killed or unknown (*d*) wild (wolf, jackal, pariah dog, fox, bat, etc.)	—	Serum[2] immediately, followed by vaccine[1]

[1] Practice varies concerning the volume of vaccine per dose and the number of doses recommended in a given situation. In general, the equivalent of at least 2 ml of a 5% tissue emulsion should be given subcutaneously daily for 14 consecutive days. Many laboratories use 20 to 30 doses in severe exposures. To ensure the production and maintenance of high levels of serum-neutralizing antibodies, booster doses should be given at 10 days and at 20 or more days following the last daily dose of vaccine in *all* cases. This is especially important if antirabies serum has been used, in order to overcome the interference effect.

[2] In all severe exposures and in all cases of unprovoked wild animal bites, antirabies serum or its globulin fractions together with vaccine should be employed. This is considered by the Committee as the *best* specific treatment available for the post-exposure prophylaxis of rabies in man. Although experience indicates that vaccine alone is sufficient for mild exposures, there is no doubt that here also the combined serum-vaccine treatment will give the best protection. However, both the serum and the vaccine can cause deleterious reactions. Moreover, the combined therapy is more expensive; its use in mild exposures is therefore considered optional. As with vaccine alone, it is important to start combined serum and vaccine treatment as early as possible after exposure, but serum should still be used no matter what the time interval. Serum should be given in a single dose (40 IU per kg of body weight) and the first dose of vaccine inoculated at the same time. Sensitivity to the serum must be determined before its administration.

1. The antibody response to a reduced number of doses of vaccine is not as good as the response to the standard schedule and is usually inhibited by a dose of serum given at the start of treatment.

2. Serum given at the start of a reduced schedule of primary immunization may sometimes interfere with the ability of the subject to respond to a later booster dose of vaccine.

3. Serum given at the time of a single booster dose of vaccine interferes with the booster effect.

4. Individuals previously immunized with a primary course of vaccine respond well to a booster dose of vaccine given 30, 60, 90 or 120 days following the first inoculation of vaccine. The antibody response to the booster dose appears within eight days. However, this booster effect is not observed 100 percent of the time.

Repeated exposure of persons in high-risk occupations means repeated treatment, which increases the possibility of severe reactions. If a reaction occurs and further immunization is indicated, vaccine prepared from non-nerve tissue should be used and corticosteroids should be considered.

The Expert Committee on Rabies suggests a schedule of immunization consisting of two or three injections of a potent antirabies vaccine of a non-nerve-tissue type given at one month intervals and followed by a booster injection given six months later. Antibody titer should be determined one month after the booster injection. If this is negative, booster injections should be continued at least until antibodies can be demonstrated. If the individual continues to work under conditions of risk, he should be revaccinated with a similar booster dose every one to three years and on exposure. However, field trials indicate that regardless of the schedule of immunization an antibody response does not occur in all vaccinated individuals. Barely demonstrable levels of antibody response were obtained when three intradermal doses of HEP (high egg passage) Flury vaccine were given five days apart, but the individuals inoculated in this way responded promptly and efficiently in producing antibodies to a later booster dose of the same vaccine. One or two doses of serum completely suppressed antibody response to three doses of HEP Flury vaccine and to a later booster dose of this vaccine. If prophylactic immunization is carried out with these vaccines, it is essential that a detectable antibody response be found by checking a serum sample obtained one to two months after completion of vaccination. Booster doses can be repeated until antibody is detectable.

For mild exposure to rabies in an individual who has demonstrated an antibody response to antirabies vaccination received in the past, a single booster dose of vaccine is recommended. In the case of a severe exposure, five daily doses of vaccine followed by a booster dose 20 days later should be given. Because of variation in vaccine potency and individual response, immunization should not be considered complete until antibody is demonstrated in the serum. At least two studies have indicated that the subcutaneous route of inoculation appears to be at least as effective as the more commonly employed intradermal route, if not more so.

Farrar, Warner and Vivona demonstrated that most persons who have received three or more injections of any rabies vaccine within four years will show antibody in the blood 30 days after a single booster injection of duck-embryo vaccine. The Expert Committee on Rabies in their fourth report demonstrated that people who have been immunized and are given a booster dose of vaccine within 120 days following the first inoculation of vaccine produce an antibody response to the booster dose within eight days.

Cohen and associates studied a group of 20 college students who were given four inoculations of duck-embryo rabies vaccine at weekly intervals, a booster dose at the end of one year, and a second booster dose one year later. Twelve days following the second booster dose, 80 percent of the group had antibody titers greater than 1:100.

New Vaccine

The vaccines most extensively studied have been those produced in tissue cultures. Wiktor and Koprowski have reported the development of a new rabies vaccine cultured in human diploid cells. The antigenicity of two strains of rabies virus (HEP Flury, Pitman-Moore) propagated in a human diploid cell strain and used as live and inactivated vaccine has been studied in rhesus monkeys and other animals. These strains were found to be much more antigenic than the same strains of virus propagated in embryonated avian eggs before adaptation to tissue culture. Significant antibodies were produced within seven days in many experimental animals. Only one to three inoculations have been required to produce immunization in these animals.

The references cited in this paper will be included in the author's reprints or may be obtained from the Editorial Department, *Postgraduate Medicine,* 4015 West 65th Street, Minneapolis, Minnesota 55435.

CRABS—THE RESURGENCE OF *PHTHIRUS PUBIS**

A. Bernard Ackerman, MD, New Eng J Med 278(17):950–951, April 25, 1968.

Crabs *(Phthirus pubis),* the pubic or crab lice, have traditionally been a sociologic fingerprint marking society's refuse—the vulgar, promiscuous and unwashed. This concept is no longer valid in permissive America of the 1960's. Today, crabs are harbored not only by streetfighter and streetwalker but by executive and debutante. A unique contemporary source for dissemination of crabs is the "hippie love-in," where more than flowers is exchanged. It is not surprising that the incidence of *P. pubis,* like that of other venereal diseases, has risen significantly as the boundaries of sexual freedom have blurred. It is incumbent upon practitioners of medicine to be able to recognize crabs and to be familiar with their epidemiology, natural history and therapy.

This louse is picturesquely named because, when examined under the microscope, it strikingly resembles a crab. The parasite is only 1 or 2 mm in length and is as broad as it is long. Its forelegs are slender, with long delicate hooks at the tarsal extremity. The second and third pairs of legs are stouter and are equipped with powerful claws that clasp the body hairs. The head is endowed with short antennae and small, pigmented eyes. Supporting the arthropod's wingless body are eight tiny conical feet, terminating in bristles.

P. pubis is contracted chiefly, although not exclusively, by contacts coincidental with sexual intercourse and rarely by transmission from bedding and bedclothes. The pubic louse, as its name suggests, makes its headquarters in the pubic hair, although it can be found on any terminal hair of the body. The perianal and axillary areas are favorite haunts, but hair of the trunk, thigh, beard and scalp, as well as eyelashes, is occasionally infested. Crab lice are notably lethargic, and it is improbable that their migration from the pubic region to distant hairy places is self-propelled. It is more likely that their transfer is mechanical, assisted by towels and other inanimate objects and by animated scratching. The typical crab louse, far from being a nomad, tends to settle down at one spot. It grasps a hair with the legs of both sides of its body, inserts its mouthparts, specialized for piercing the skin, into a capillary and remains attached, feeding intermittently, sometimes for hours at a time.

Once it is established on its human host, the life cycle of the pubic louse, from egg to egg, is completed in approximately 25 days. Eggs, or nits, laid by the female adult are securely cemented to hairs. After incubation of seven to nine days, a nymph is hatched that resembles the adult in every feature except sexual organs. The nymph, also remarkably stationary, meanders only a few millimeters a day, feeds from cutaneous capillaries and gradually grows. After three molts, spanning another 13 to 17 days, the nymph attains adulthood. Within 24 hours of achieving sexual maturity, the louse mates, as it does subsequently thereafter, whenever adult male and female lice meet. Fertilized females begin to lay eggs within 24 hours after copulation and proceed to produce about three ova daily until from 24 to 48 hours before their death. Adult life expectancy is about 30 days. Pubic lice are obligate parasites, spending their entire lives on the skin and living exclusively on human blood. Consequently, separated from the host they cannot survive, and they succumb in less than 24 hours.

The crab louse excites a variable response in the host, ranging from no symptoms to maddening itching. It is the intolerable pruritus that usually prompts the patient to seek medical care.

On physical examination, excoriations, some impetiginized, frequently bear testimony to the host's attempt to rid himself of the parasites. Sites of predilection, when carefully searched for with a hand lens, reveal nits and the louse itself. It is difficult to identify them by naked-eye examination alone. Nits are visible as small, oval, whitish, transparent objects about 0.5 mm in length. Each ovum is attached to one side of a hair near the skin junction by a chitinous envelope that completely encases the shaft. As the hair grows, the nit, which is oriented along the hair axis, is concomitantly edged farther from the skin. Nits, bound to hair by this adhesive secretion, cannot be moved along the shaft with the fingers or easily flecked off.

Even with the aid of a lens, the pubic louse may escape detection. The lice population on a naturally infected subject is small, usually no more than 10 although as many as 100 have been counted on the eyelashes of a single person; in this site, they may induce blepharitis. Furthermore, the minuscule parasite is especially difficult to espy on Caucasian skin, being beautifully camouflaged by its natural

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yellowish-gray color. These voracious blood suckers are more readily discerned after a feeding. When distended with blood, they appear as rust-colored specks clinging to hairs. As fresh blood flows in one end, reddish excreta are discharged from the other, and these pellets can be seen strewn about the skin. The diagnosis of *P. pubis* should be confirmed in every case by microscopical examination of the arthropod or its nits or both.

Pubic-lice bites can also induce a unique cutaneous eruption characterized by asymptomatic peculiar bluish or slate-colored macules that do not blanch upon pressure with a glass slide. These macules, 0.5 to 1.0 cm in size, located chiefly on the trunk, usually wane within a few days. They are termed *maculae caeruleae,* "sky-blue spots," and represent small hemorrhages into the skin.

Unlike the body louse, which is the vector for the rickettsiae of typhus and trench fever, as well as for the spirochete of relapsing fever, the pubic louse is not known to purvey pathogens of human disease.

Simple effective treatment for pubic lice is available. One percent gamma benzene hexachloride,* dispensed as cream, lotion or shampoo, is curative. The cream or lotion is to be massaged into the affected hairy areas and thoroughly washed off after 24 hours. The shampoo may be employed instead of cream or lotion and is lathered on for four minutes. The hair is then rinsed, rubbed with a dry towel and combed with a fine-tooth comb to remove any remaining nits. One application is usually sufficient to eradicate the parasites and nits, but, with heavy infestation, it may be necessary to repeat the procedure two or three times at four-day intervals. It is not necessary to shave affected hairs. Since pubic lice and their nits do not flourish on fibers, clothing need not be permanently discarded or disinfected. To prevent the possibility of reinfection from clothing in which hairs bearing viable nits may have lodged, the patient should be advised to use freshly laundered undergarments and bedlinens daily. Exposed clothing should not be worn for at least forty-eight hours. The topical use of older remedies, such as DDT powder and mercury ointment, which may produce systemic toxicity and provoke contact dermatitis, is no longer necessary. Insects may be eliminated from the eyelashes by the application of 0.25 percent physostigmine ophthalmic ointment† with a cotton-tipped applicator.

Because acquisition of *P. pubis* is overwhelmingly secondary to sexual contact, the physician should evaluate each patient with crabs for evidence of other venereal disease and should include a serologic test for syphilis.

* In the form of Kwell, Reed and Carnrick, Kenilworth, New Jersey.
† 0.25 Eserine Ophthalmic Ointment, Abbott Laboratories, North Chicago, Illinois.
(The omitted figures and references may be seen in the original article.)

PRINCIPLES OF THERAPY IN ANGINA PECTORIS

William C. Elliott, MD, Indianapolis,*
J Indiana Med Ass 61(2): 185–189, February 1968.

Many forms of therapy are currently being suggested for angina pectoris. To utilize these various tools, it is important to understand certain principles which have become apparent in recent years.

A. Coronary and Myocardial Physiology

1. *Aerobic Metabolism*—The normal heart utilizes aerobic metabolism. It is rich in oxidative apparatus. Only under extreme conditions does it change to less effective anaerobic metabolism. The muscle extracts and oxidizes any fuel source available. According to arterial concentrations, it utilizes varying amounts of ketones, fatty acids, lactic acid, pyruvic acid and glucose.

2. *Flow Dependence*—The aerobic needs of the heart are met first by coronary flow. With increased demand due to exertion, the extraction of oxygen remains constant (70 percent) and flow increases.

3. *Autoregulation of Coronary Flow*—With increased myocardial metabolism some product (possibly adenosine) is released which dilates the small coronary vessels that control resistance. This autoregulation of flow maintains a balance between supply and demand. The large coronary vessels offer little resistance to flow unless they become diseased.

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4. *Collateral Vessels*—Potential collateral connections between the coronary vessels exist. They do not increase in size or flow unless there is a pressure differential between arteries. Pressure and flow do not drop across a coronary arterial stenosis until it exceeds 75 percent of the lumen. However, any stenosis may offer abnormal resistance and reduce the reserve capability for increasing flow.

5. *Coronary Inadequacy*—Coronary inadequacy may result from coronary arterial obstructive disease or from the combination of hypertrophy and increased myocardial oxygen demands as in aortic stenosis. When coronary flow is inadequate, several abnormalities result:

a. *Increased Oxygen Extraction*—With flow restricted there is a limited attempt to extract more oxygen from the blood available.

b. *Anaerobic Metabolism*—With oxygen deficit, myocardial metabolism becomes anaerobic.

Using anaerobic metabolism, the myocardium functions like skeletal muscle and no longer requires oxygen to produce energy. The energy source, adenosinetriphosphate (ATP), is derived from utilization of glucose and glycogen without oxidation. The glycogen is stored intracellularly and glucose enters the hypoxic cell membrane at an increased rate. The end result of this glycolytic metabolism is a reduced amount of energy from ATP and an intracellular accumulation of lactic acid. Myocardial cells remain viable but centractile force is reduced. If ischemia is extensive, cardiac output is depressed and the filling pressures in the heart increase. This results in heart failure and may be the basis for dyspnea often associated with angina.

With these changes the cellular membrane integrity is altered and potassium is lost from the cell and the characteristic ST-T depressions of ischemia develop on the ECG.

If oxygen is restored with blood flow, metabolism reverts to aerobic within one minute. This reversibility remains possible for about 30 minutes. Cellular acidosis is the setting for necrosis with activation of proteolytic enzymes but it is unlikely that short periods of ischemia result in cell death. It has been demonstrated that the subendocardial muscle is the area most susceptible to hypoxia when coronary flow is reduced. Ischemia starts there and is usually greatest in this zone.

6. *Myocardial Lactate Production*—The lactic acid that accumulates inside the hypoxic cell cannot be metabolized further because oxygen is not available. Lactate then diffuses into the venous blood. Normally the heart extracts lactate from the arterial blood and uses it as fuel. With ischemia, the muscle produces lactate and venous levels exceed arterial concentrations.

This abnormality, lactate production, may be detected clinically by catheterization of the coronary sinus. Measurements are made at rest and with some cardiac stress such as exercise, isoproterenol infusion or pacing the heart at a rapid rate. It is usually possible to test for lactate production by moving the coronary sinus catheter into several different positions. This allows sampling of the venous drainage from the anterior, lateral or inferior surface of the left ventricle. It is often possible to localize the area of myocardial ischemia.

This technic has been found to be a more sensitive indicator of ischemia than the resting or exercise ECG or by the use of coronary angiography alone. It is also superior to indirect measurements of coronary flow or detection of increased (abnormal) myocardial oxygen extraction patterns.

Metabolic studies of lactate metabolism are very useful in interpretation of coronary angiograms. Pictures alone are not always adequate to judge the functional significance of arterial lesions.

7. *Pain Production*—Myocardial lactate production has been observed both with and without angina and other evidence of ischemia. High arterial concentrations of lactic acid do not produce pain. The exact substance which stimulates pain receptors has not been identified. Potassium leakage and tissue acidosis are similar to the conditions found in inflammation and may activate the release of a plasma or tissue kinin. Kinins are known to stimulate pain fibers in inflammation. However, the observation that acute myocarditis is rarely a cause of myocardial pain makes this explanation less attractive.

B. Therapeutic Principles

1. *Accurate Diagnosis*—Selective coronary cinearteriography is a safe means of determining the location and severity of arterial lesions in angina pectoris. It is very accurate if attention is given to radiographic technic and interpretation is based on experience. For optimal information, myocardial lactate production should be sought at the same study. Ventriculography and ventricular function studies are important in making clinical decisions.

a. *Coronary Type Pain and Normal Coronary Angiograms*—Repeatedly, patients with a classical description of angina are found to have no arterial lesions. Some have a positive Master's test and others have non-specific ECG abnormalities. Still other patients have little or no exertional pain but

have repeated episodes of pain similar to coronary insufficiency. They frequently require hospitalization but have no arterial lesions visualized. The problem of chest pain may become disabling and management is difficult as no effective therapy has been found. No deaths or definite myocardial infarctions have been reported.

The cause of the pain is not clear but some of these patients have been found to have myocardial lactate production. They are not all neurotic. Theories of the etiology of the syndrome abound. Among these, it has been suggested there may be coronary spasm, small vessel disease or abnormal oxygen-hemoglobin dissociation.

b. *Angina with Typical Lesions*—Coronary angiograms permit diagnosis down to the tertiary vessels. Collaterals which are much smaller can be detected. There has been no consistent correlation between symptoms, arterial lesions and collateral development.

2. *Factors Contributing to Pain*

a. *Determinants of Myocardial Oxygen Consumption*—To further understand the production of ischemia, it is important to understand the circumstances that result in increased coronary flow. The determinants of myocardial oxygen consumption are complex. These include ventricular wall tension which is related to ventricular volume and the pressure generated. Also the speed of shortening of myocardial fibers contributes to the oxygen requirement.

In most clinical situations, the pressure generation is the principal factor that governs oxygen usage. It is useful to think in terms of the amount of pressure generated per minute. The term, Pressure Time Per Minute (PTM or Tension-Time Index, TTI) is derived from multiplying the mean systolic pressure by time of systole by minute heart rate.

Most angina patients have a reproducible threshold for angina at some PTM value. When this PTM level is reached by exercise, increased atrial pacing or emotional stress, the subject experiences pain. This point may be reached by alteration of rate or blood pressure.

This concept is helpful in understanding the genesis of a specific patient's pain. It does not depend on knowledge of the other secondary factors such as cardiac output, mechanical work of the heart, volume or rate of contraction.

Occasionally in dilated hearts with increased volume and wall tension, reduction of volume by digitalis and diuresis results in reduction in angina. This is not common and control of PTM is the usual means of ameliorating the symptoms.

3. *Exercise Tolerance Testing*—Another important principle is the use of the exercise tolerance test to determine effectiveness of therapy. If therapy is effective it can be measured in exercise testing to the point of pain. Subjective reports of improvement may be misleading.

This testing is safe with either simple Master's two-step apparatus or with elaborate quantitative measurement of workload, ECG response, oxygen consumption and blood pressure. Testing should be done well after meals and a rest period. The testing should be repeated to determine the variability in each subject.

Exercise tolerance records give objective indication of the progression of the therapy or the disease. This should be the backbone of angina management programs.

C. Specific Therapy

1. *Nitrites*—Nitroglycerine is effective in two ways. The main action of the drug is to reduce the work of the heart and reduce systolic pressure. PTM usually decreases even with a compensatory rate increase. Coronary flow does not then increase, but in animals, the drug results in a redistribution of flow to ischemic areas by increasing collateral flow. This is achieved by decreasing large vessel resistance which promotes collateral flow.

Nitrites will reduce the oxygen requirements of the heart if they can be supplied in adequate arterial concentrations. The problem is that oral preparations are deactivated by the portal circulation. Sublingual preparations are the only reliable means of administration (except inhalation or skin absorption). Five mgm isorbide dinitrate (Isordil) or 5 mgm erythrityl tetranitrate (Cardilate) taken sublingually may act longer than the usual doses of nitroglycerine.

The effectiveness of oral forms of these drugs remains variable and uncertain.

2. *Dipyridamole (Persantin)*—Dipyridamole has little clinical effectiveness. The drug increases coronary flow without increasing myocardial oxygen consumption. It blocks the autoregulatory mechanism and flow increases but there is no augmentation of collateral flow. Therefore, drugs that increase total myocardial blood flow are not necessarily beneficial in ischemic heart disease.

3. *Beta Adrenergic Receptor Blocking Drugs*—Propranolol (Inderal, Ayerst) is the newly released beta-adrenergic receptor blocking drug. It is cur-

rently approved for use in cardiac arrhythmias but is still under investigation for use in angina. Its use for investigation in coronary disease still requires consent of the patient.

The sympathetic nervous system acts on the heart by stimulating beta receptors resulting in an increase in rate and contractility. Beta blocking drugs will result in rate reduction and a decrease in contractility.

This drug is the most effective agent ever used in angina. In proper doses nearly all subjects will improve somewhat. Total rehabilitation is possible in many.

With oral use, the rate decreases to 50-60 beats per minute and blood pressure may decrease with lowering of the cardiac output. With beta blockade, the tachycardia of exercise is blunted although the exercise is still possible. PTM remains low and exercise tolerance improves. The greatest improvement in exercise tolerance is found with the combined use of propanolol and sublingual nitrites. With this combination, both blood pressure and heart rate are reduced, hence, myocardial oxygen demands are minimized.

There are some limitations to the use of this active agent:

a. By cardiac output reduction it may precipitate congestive failure.

b. The drug will increase bronchospasm in asthmatics.

c. It should be used with caution in diabetics.

d. Excessive bradycardia may result.

Several other questions have come from investigation of the drug. It has resulted in myocardial lactate production in patients with coronary disease. The cause is not clear but may be due to a reduction in collateral flow when total coronary flow is reduced. It is not known if collateral development would be adversely affected.

In addition, beta-blockade would not be advantageous in an angina patient who developed an acute infarction which resulted in hypotension or shock. However isoproterenol infusion, in high doses, can partially reverse beta-blockade.

Also there has been a report of diffuse myocardial damage in rats treated with high doses of the drug. This awaits confirmation and interpretation.

For these reasons long-term therapy in angina pectoris may not be advisable with propranolol.

4. *Control of Hypertension*—Elevations of systolic pressure increase PTM and the energy demands of the heart. Often prolonged bouts of chest pain are associated with episodes of hypertension. The blood pressure may rise before the pain. It is not certain if the coronary vasculature participates in the vasoconstriction. Thus, observations of blood pressure and pulse are indicated in any angina subject during pain to determine if systolic pressure lability is part of the etiology. The pressure response to nitroglycerine is often helpful in understanding the symptomatology.

Spikes of systolic pressure are difficult to control, especially if the patient is usually normatensive. Heavy sedation may be helpful. Caution must be used if propranolol and reserpine are combined as excessive catecholamine depletion may result.

The reduced exercise tolerance due to breathing cold air may be due to an increase in peripheral vascular resistance. This may be abolished by use of a weather mask.

Sleep studies have shown that nocturnal angina is usually associated with dream activity. Hypnotics are of little value but the combined use of propranolol and nitroglycerine ointment (Nitrol) reduces the cardiovascular response to emotional stress in dreams.

5. *Strenuous Exercise in Angina*—Objective improvement in exercise tolerance due to regular graded exercise has been established. The gains are not maintained when exercise is stopped. The improvement is due to conditioning. When conditioned the subject can do more exercise while the heart does less work. The effect is similar to beta-blockade.

It has not been proven that collaterals develop more in response to exercise. Angiographic demonstration of collaterals depend on the technic of injection. Any claims of augmented collateral development due to exercise must be closely examined on technical grounds. Continued improvement in exercise tolerance after stopping the exercise program would argue for collateral development. Many subjects with angina cannot embark on exercise programs. Some others note that angina clears on continuing exercise. This "warm-up" phenomenon may be explained by high arterial lactate concentrations secondary to skeletal muscle activity. Lactate is a potent peripheral and coronary dilator.

Exercise of patients with ischemic heart disease is hazardous and deaths have occurred during exercise in various programs. Ischemia can be detected by ECG during exercise in patients with no pain.

The claims that mortality is decreased by exercise in ischemic heart disease are not based on controlled studies. These claims have been derived by

comparison with mortality in years when treatment of myocardial infarction was not highly developed.

Until more definitive studies show positive benefits from exercise, it is not clear that the advantages outweigh the risks.

6. *Myocardial Revascularization*—Several new principles have been discovered concerning revascularization.

a. When arteries are implanted into the normal, non-ischemic myocardium, most will eventually be found patent. They also establish small artery to artery communications with the existing coronary bed.

b. If the nearby coronary is severely stenotic or occluded, the implanted vessel will offer significant collateral flow to the diseased vessel below the obstruction.

c. Both internal mammary arteries and abdominal arteries can be implanted in various surfaces of the left ventricle.

d. Criteria for successful implantation are:

1. Stenosis of 90 percent or more in a major coronary vessel.

2. Angiographic demonstration of collaterals into the ischemic area suggesting "demand" for collaterals.

3. Lactate production from the area to be implanted.

Further definition of the area with greatest "demand" has been done by intra-operative regional myocardial blood flow. Isotope solutions are injected into the surface of the muscle and the slowest clearance defines the area of lowest flow.

Using these technics, implanted vessels have been shown to offer collaterals at recatheterization studies one year after operation. Aside from convincing clinical and angiographic results, metabolic studies have suggested reduction in ischemia. In a small number of patients, it has been demonstrated that lactate production has been eliminated one year after operation with a functioning mammary implantation.

Animal experiments have shown that implanted arteries can almost totally replace ligated coronary vessels. Implants are capable of delivering large amounts of flow and respond to increased demands with more flow. Experiments have suggested greater survival in animals that have implantations prior to coronary ligations. However, the indications for the operation remain based on the clinical effectiveness of the procedure in angina.

Mortality in the operation can be maintained under five percent by exclusion of patients with severe heart failure and careful maintenance of blood pressure during the operation. No cardiac bypass is necessary in these procedures.

In some patients, direct patch graft procedures are possible to relieve a severe, proximal right coronary stenosis. This requires cardiac bypass but is indicated in selected cases.

7. *Combined Therapy*—The combined use of sublingual nitrites, a beta-blockade and revascularization has been successful in many patients with severe angina. The goal has been to control symptoms with drugs until six to 12 months has passed after revascularization operation. During this time the implanted vessels continue to develop as a source of collaterals. Beta-blockade is discontinued as soon as symptoms permit.

Summary

With inadequacy of coronary flow, the myocardium changes from aerobic to anaerobic metabolism. This can be detected and localized by sampling several sites in the coronary sinus for myocardial lactate production. This technic is used to aid in interpretation of selective cine coronary arteriograms and to select therapy.

Medical therapy depends on control of myocardial oxygen requirements by control of heart rate and blood pressure. This is aided by use of sublingual nitrites and careful, short term use of the new beta-adrenergic receptor blocking drugs. Surgical revascularization by arterial implantation has been proven successful in carefully selected subjects. This offers a more definitive therapy than use of drugs alone.

(The references may be seen in the original article.)

MEDICAL ABSTRACTS

SYNDROME ASSOCIATED WITH THE ABUSE OF ANALGESICS

M. Henry Gault, MD MSc FACP, et al., Ann Intern Med 68(4):906–925, Apr 1968.

Twenty-two patients with renal disease seen over a 4-year period had abused analgesics containing acetylsalicylic acid, phenacetin, caffeine, and in all but one instance codeine. The minimum duration of abuse was 3 years and the average, 12. Average total consumption was estimated to be 11 kg of ASA, 8 kg of phenacetin, 2.5 kg of caffeine, 0.4 kg of codeine, or 50,000 tablets. Papillary necrosis was demonstrated bilaterally in 15 patients and when active was often associated with hematuria and abdominal or loin pain. The 24-hr creatinine clearance was less than 50 ml/min in 18. Proteinuria was slight or absent, and an increase in urinary leukocyte excretion in the absence of infection was common. Acidosis, passage of papillae, and hypertension were important considerations in some patients. Bacterial infection of the kidney did not appear to be an important factor in the majority.

Although features of renal disease may dominate the clinical picture, they are often absent until late in its course; related symptoms often occur only after many years of abuse and are frequently preceded by long-standing evidence of psychiatric disorder and headache and the more recent onset of upper gastrointestinal disease and anemia. These disorders occur in the same patient often enough in association with abuse of aspirin, phenacetin, and caffeine-type analgesics, both in this series and the literature, to warrant referring to them as a syndrome. Psychiatric abnormalities include long-standing personality disorders often associated with immaturity, dependence, emotional instability, anxiety, depression, and habituation to other drugs and alcohol; in most cases the psychiatric disorder must be considered the primary factor in the development of abuse and an essential aspect of treatment. Peptic ulceration of stomach or duodenum is a common association, and in this series resistance to treatment or bleeding led to gastrectomy in 12 patients. Anemia may be due to one or more of several causes.

A history of abuse has to be sought carefully and may be denied. Demonstration of a positive ferric chloride test in urine or of sulfhemoglobin in blood provides suggestive evidence; these tests are also useful in follow-up studies.

The majority of such patients can be persuaded to stop abusing this type of analgesic; hence, the complications of abuse must be considered preventable in the majority and require publicity.

PERFORATED PEPTIC ULCER

W. J. Burdette, PhD MD, and B. Rasmussen, MD, Surgery 63(4):576–585 Apr 1968.

Accepted methods of treatment for acute perforated peptic ulcer vary widely. The surgeon may choose between continuous aspiration, simple closure, and immediate resection. Despite the adoption of the principle of immediate resection by many clinics during the past 20 years, the majority of perforated ulcers in the United States are still treated by simple closure. This has been the treatment followed by the staff treating the cases reported here, except for an occasional patient managed by continuous nasogastric suction because of some special indication.

In order to gain information concerning the outcome of this therapy and to evaluate factors leading to increased morbidity and death, a study was made of the 103 cases of gastroduodenal perforation seen at the Salt Lake County Hospital and the Salt Lake Veterans Administration Hospital from July, 1954, through June of 1965, including those first discovered post mortem. The records of all patients upon whom vagotomy and pyloroplasty were performed during the same period were also analyzed.

1. Treatment in 103 patients over a 10-year period resulted in an overall mortality rate of 24 percent and a mortality rate of 16 percent following simple suture. These results do not support the idea that this operation should be considered instead of vagus resection and drainage because of lower mortality.

2. The main factors associated with increased morbidity and death were advanced age, length of time from perforation to beginning of treatment, severe associated disease, and failure to make the correct diagnosis.

3. The increased morbidity and death with large perforations in large chronic ulcers, gastric ulcer, coexistent hemorrhage, and multiple ulcers are confirmed.

4. Immediate definitive operation whenever possible and routine definitive surgical treatment within

a few weeks, if simple plication is or has already been done, are strongly recommended as a firm policy in managing patients with perforated peptic ulcer.

CLINICAL AND *IN VITRO* STUDIES ON THE ROLE OF IMMUNOTHERAPY IN RAGWEED HAY FEVER

L. M. Lichtenstein, MD PhD, P. S. Norman, MD, and W. L. Winkenwerder, MD, Amer J Med 44(4):514–524, Apr 1968.

The role of immunotherapy in ragweed hay fever has been investigated by a combination of clinical and laboratory technics. In the clinical study a course of immunization with the principal antigen of ragweed (antigen E) was compared to placebo injections in matched groups of patients. Double blind evaluation of the patient's symptoms was performed in a semiquantitative fashion by patient diary and physician examination. The laboratory study involved an *in vitro* model of human allergic reactions: the antigenically induced release of histamine from the isolated leukocytes of sensitive donors. This system allows an independent evaluation of cellular reactivity and the level of blocking antibodies, the latter measured by their ability to inhibit the *in vitro* allergic response. The sensitivity of an untreated donor's cells to ragweed antigen E correlated significantly ($P<0.01$) with the degree of clinical illness suffered during the season of rawgeed pollination. Immunotherapy did not change the dose-response relationships of the sensitive cells, but the cell sensitivity symptom correlation was altered so that the symptoms in the treated patients were less than predicted by their cell sensitivity. Blocking antibody was increased by immunization to levels several thousandfold greater than control. The antibody response correlated significantly with the quantity of antigen E administered (17 to 800 μg.).

Of eighteen pairs of treated and placebo patients, matched by cell sensitivity measurements, the treated partner had an appreciably lower symptom score in 10 pairs, there was little difference in 7 pairs and the untreated partner had a lower score in one pair ($P<0.01$). The patients with the higher levels of antibody did better, on the average, than those with the lower. The relationship, however, was neither precise nor constant. This may be due to the lack of precision inherent in evaluating symptoms, but it is also possible that antibodies closer to the target organ, e.g., in the nasal secretions, are more important than serum antibodies.

AN ACTIVE DIAGNOSTIC APPROACH TO BLUNT ABDOMINAL TRAUMA

R. J. Freeark, MD FACS, L. Love, MD FACR, and R. J. Baker, MD FACS, Surg Clin N Amer 48(1):97–109, Feb 1968.

Recent statistics suggest that over two million Americans will be injured in automobile accidents this year. In addition, civilian and military violence is an ever-increasing individual hazard. A significant proportion of the more serious injuries will involve the abdominal viscera; the responsibility for prompt diagnosis may rest with physicians who have limited experience with such emergencies.

Newer diagnostic techniques can facilitate evaluation of the injured patient, especially when multiple injuries are encountered in a given patient. By placing the recognition of abdominal injury on a more objective basis than that provided by history and physical examination, and by interjecting additional special skills into the early management of accident victims, the likelihood of diagnostic omission is lessened considerably.

This report is concerned with the indications for and application of several diagnostic maneuvers designed to facilitate the recognition of abdominal injuries. These techniques have been used in the management of a large number and variety of patients seen in the emergency room and on the wards of a large metropolitan hospital. It has become apparent that they constitute a valuable addition to the armamentarium of those charged with the care of the injured.

DENTAL SECTION

MARGINAL DISCREPANCIES IN PORCELAIN INLAYS PREPARED BY DIFFERENT TECHNIQUES

LCDR R. K. Hill, DC USN, and LCDR R. A. Shelin, DC USN.

A comparison was made of the marginal fit of porcelain inlays fabricated by three techniques: (1) The fusing of porcelain directly into a refactory investment mold made from an impression of the preparation, (2) the rapid firing of porcelain in a platinum matrix made by the standard technique of swaging platinum foil into the concave preparation, and (3) the rapid firing of porcelain in a platinum matrix made by the reverse technique of swaging platinum foil over the convex surface of a resin pattern formed in the preparation. For each technique, five Class V porcelain inlays were made on individual dies with low-fusing (1,875° F.) porcelain. The inlays were cemented into the dies, and each die was then sectioned incisogingivally and mesiodistally. Microscopic measurements of the separation between the inlays and dies showed that discrepancies averaged 136±60 microns for inlays made by the investment technique, 62±16 microns for those made by the standard matrix technique, and 70±41 microns for those made by the reverse platinum matrix technique. The fit of inlays made with platinum matrices was significantly better than the fit of those made with investment molds. The difference between inlays made by the two platinum matrix techniques was not significant. It was concluded that the method of choice is the reverse platinum matrix technique, in which the thickness of the platinum foil does not affect the dimensions of the inlay.

(Abstract by Research Work Unit: MR005.19–6052 by LCDR R. K. Hill, DC USN, and LCDR R. A Shelin, DC USN.)

EVALUATION OF INSTRUCTIONAL PROCEDURES FOR PROMOTING BETTER ORAL HEALTH

LCDR Mark O. Brose, DC USN.

The purpose of this study was to evaluate the effectiveness of two different instructional techniques in terms of the retention of dental information and improvement in oral health. Eighty-two high school students and naval officers were randomly divided into three groups, of which the first received individual instruction, the second received group instruction, and the third (control) received no instruction. Instruction consisted of an oral presentation, with points made in the lecture reinforced by 10 colored slides. A written test, consisting of 17 short answer questions, was devised to reveal elementary dental knowledge. All subjects completed this test prior to instruction and again 4 and 6 months following instruction. Test scores prior to instruction were high (13.8±1.8). Initial and subsequent test scores revealed no significant difference between any of the groups either in initial dental knowledge or in retained knowledge acquired in a single lecture. A simplified Oral Hygiene Index (OHI) score was obtained for each participant at the beginning of the study and again at its conclusion. There was some improvement in the OHI scores for all groups, but results were inconclusive as to the effect of instruction. It was concluded that the average individual with a high school education already has considerable elementary dental knowledge and that neither the extent nor the application of this knowledge can be improved by a single lecture, whether heard individually or as a member of a group.

(Abstract by Research Work Unit: MR005.19–6052 by LCDR Mark O. Brose, DC USN.)

PERSONNEL AND PROFESSIONAL NOTES

DENTAL DIVISION CHIEF DEPARTS

At the close of five years as Chief of the Dental Division, it is difficult to develop an all-inclusive statement of gratitude for the magnificent support that I have received from the thousands who comprise our organization and those who work with us. Also, words are inadequate as I endeavor to express my particular thanks to the large numbers of personnel who are actively engaged in the war effort in Vietnam. Not to be forgotten are the wives who maintain a high level of cheer in our households and the Reserves who stand ready to aid us as the needs arise.

To all of you I offer my deepest appreciation and best wishes for a bright future. The opportunity to serve as your Chief has been a privilege which I will always cherish. May God bless each of you.

F. M. KYES
Rear Admiral, DC, USN
Assistant Chief of the Bureau of
Medicine and Surgery (Dentistry)
and Chief, Dental Division

BRIDGING THE GAP

RADM Frank M. Kyes, DC USN.

In the belief that innumerable good positions do and will exist in local, state and national health programs for dental hygienists or people who have a two-year college qualification in a paradental field, the Dental Division is actively pursuing an investigation to determine what college credits may be derived from experience in the Dental Technician Rating.

CASE stands for a civilian organization which recommends the extent of college credits which may be granted for various Navy schools and training. Its full name is Commission on Accreditation of Service Experience (CASE), an arm of the American Council on Education, 1785 Massachusetts Avenue, Washington, D.C. 20036. Station Education Officers are well acquainted with CASE and its operations. CASE presently recommends 8 credits for Class "A" school and 12 credits for Class "B" school but has a new guidebook coming out in late 1968.

Of particular interest is the case of a Dental Technician who recently sought a teaching position in a school of dental hygiene. The state involved required two years of college credit for anyone to teach in its junior colleges—60 credits. When the CASE recommendations were totaled and when his Navy schools and training were evaluated he received 44 credits. He needed only 16 hours—one semester's work—for his two-year diploma and a good position.

A career through to retirement as a general dental technician fits individuals for health service in the community in the burgeoning need for dental auxiliaries. A dental school recently wrote the Dental Division saying, "Our five ex-Navy dental technicians are our most prized possessions."

The Dental Division is presently investigating this promising field in depth and expects to come up with worthwhile career pattern information in the near future. In the emerging national dental picture it is crystal clear that there is a "path of continuance" for career dental technicians when they retire from service to their country.

DENTAL TECHNICIAN TRAINING

Because of a need for providing more training in the field of crown and bridge technology, the Dental Technician Prosthetic Basic Class "C" School was lengthened from 26 weeks to 34 weeks. At the same time, because of general Navy policies, the obligated service was increased from 32 months to 42 months.

There are several points worthy of comment which should serve to keep this increased obligation from being objectionable. These points italicize the fact that it is worthwhile to be a top-level prosthetic technician, if you are going to be one at all.

1. Prosthetic technology in a civilian institution is a two year course of study costing thousands of dollars.

2. There is an acute civilian shortage of prosthetic technicians existing at present and in the foreseeable future.

But:

a. So-called "plaster workers" are "a dime a dozen" and do not command high salaries.

b. It takes years to become a polished technician.

c. It is hard to break into the highly paid crown and bridge field.

Therefore:

a. In "sensible" career planning, it is best to plan on a lengthy career in the Navy to acquire sufficient ability to cash in during retired life on the need for skilled technicians.

b. A capability in crown and bridge techniques puts a technician in the very highest brackets.

c. Viewed in this light, the extra 10 months of obligated service becomes a very minor item to a farsighted dental technician who desires to train himself for a highly paid job following retirement.

Recently, there has been a fall-off in applications for prosthetic school to the degree that applicants are currently sought. It is important that dental technicians *not* be allowed to view the increased obligation as a drawback, and that they be fully aware of the additional life-time career-potential provided by training in the crown and bridge field. Dental officers are urged to acquaint themselves with the facts and assure themselves that dental technicians understand fully the ramifications of, and emoluments accruing from, the burgeoning prosthetic technicians craft, provided the individual stays in long enough to acquire wide competence, particularly, in the crown and bridge field.

Most of the above is likewise applicable to the Dental Repair Technician and additional applications from qualified personnel who desire training in this field are desired.

NURSE CORPS SECTION

SHORT COURSES FOR NURSE CORPS OFFICERS

During the months of May and June, over one hundred Navy nurses participated in short courses given at the National Naval Medical Center and at George Washington University.

The continuing education course in "Administration and Management" was given 3 June through 14 June 1968 and was conducted by Leon I. Gintzig, Ed.D., assisted by the faculty of the Department of Health Care Administration, George Washington University. The content of the course included basic management concepts and current trends in administration.

"Educational Teaching Methods" was given by Margaret Anne Kiley, Ed.D., Assistant Professor of Education in conjunction with other members of the School of Education at George Washington University. Nurse Corps officers attending represented thirty different naval facilities.

The Naval Medical School at Bethesda offered two additional courses. "Nursing in Outpatient Departments and Emergency Rooms" covered areas in medicolegal considerations, consideration of outpatient department activities, programming for patient care and opportunities for health teaching.

During the week of 23 through 29 June, "Rehabilitation Nursing" was presented with leading authorities in the field presenting papers and taking part in discussions, demonstrations and practice. Topics ranged from rehabilitation of patients with cardiovascular disorders, radical cancer surgery, respiratory disease to rehabilitation of the drug and alcohol addict.

PREVENTIVE MEDICINE SECTION

MOW IN SAFETY

Health 18(6), Spring 1968.

The grass cutting season is fast approaching and with it come the dangers inherent in the use of power mowers. We should take stock of a few safety rules so that we finish the season in full possession of our fingers and toes and will not have injured anyone else.

Power mowers have taken the drudgery out of grass cutting and have given us more time for golf and other pleasurable activities. The power mower is a helpful tool, but a potentially dangerous one, and during use should command our full attention and respect. There are approximately 80,000 injuries—some fatal—each year from power mowers. Men, women, and children are all involved.

Finger and toe amputations and injuries from objects thrown by the blades can be avoided by heeding the following safety suggestions offered by the Outdoor Power Equipment Institute:

1. Never adjust mower or change attachments until the engine has been turned off and the spark-plug wire disconnected.
2. Never fill the gas tank while smoking or while the engine is running. Never refuel a hot engine.
3. Be sure the electrical cord of electrical mowers is in good repair. Use a ground wire. Avoid mowing over wet terrain.
4. Clear lawn of all debris.
5. Clear area of all persons, particularly small children and pets.
6. Stop operation when another person approaches. Do not pass or stand on the grass-discharge side of mower when the engine is running. Stop engine before pushing across drives, walks, or roads.
7. Do not pull mower toward you, particularly on downward grade. Mow steep slopes sideways.
8. Stop motor whenever you leave the mower.
9. Control mower by hand pressure on handle, never by foot pressure on the motor housing.
10. Wear long trousers and brogues. If you have safety shoes wear them. Do not mow barefoot or in sandals.—Sanitation Sec, PrevMedDiv.

POISON IVY, OAK AND SUMAC

The North Carolina State Board of Health, Health Bull 83(4): 12, Apr 1968.

The leaves of poison ivy, oak, and sumac usually share the blame for causing an allergic rash and blisters which afflict millions of Americans during warm weather. The culprit is urushiol—an ingredient found in the sap of all 3 plants.

Urushiol is a potent substance affecting 7 of every 10 persons. It causes an allergic contact dermatitis of a severity which varies with individual sensitivity and amount of exposure. As with all allergies, it is not known why some people react to urushiol while others do not.

Contact with urushiol is necessary to develop an allergic reaction. Touching a plant is the usual method of exposure. But garden tools, work clothes, roving pets, or the smoke from burning plants can provide indirect contact with the substance.

Most people worry about scarring—which rarely occurs—and overtreat the symptoms. Removing all urushiol from the skin and eliminating indirect contact are most important procedures. A drying lotion usually relieves the rash and its accompanying itch, although a particularly susceptible person with a severe reaction should seek a physician's care.

A new folder devotes a section to pointers on how to recognize, avoid, and eliminate the plants. Single copies of "Poison Ivy, Oak, and Sumac" Public Health Service Publication No. 1723, may be obtained from the Information Office, National Institute of Allergy and Infectious Diseases, Bethesda, Md. 20014.

ENDRIN FOOD-POISONING

D. E. Weeks, Bull WHO 37(4): 499-512, 1967.

A report on four outbreaks caused by two separate shipments of endrin-contaminated flour.

Between 3 June and 15 July 1967 four explosive outbreaks of acute poisoning with the insecticide endrin occurred in Doha in Qatar and Hofuf in Saudi Arabia. Altogether 874 persons were hospitalized and 26 died. It is estimated that many others were poisoned whose symptoms were not so severe as to cause them to seek medical care or to enter the hospital.

The author describes the course of the outbreaks, and the measures taken to ascertain their cause and prevent their extension and recurrence. It was found that the victims had eaten bread made from flour contaminated with endrin. In two different ships, both of them loaded and off-loaded at different ports,

flour and endrin had been stowed in the same hold, with the endrin above the flour. In both ships the endrin containers had leaked and penetrated the sacks of flour which was later used to make bread.

These two unconnected but nearly simultaneous mass poisonings emphasize the importance of regulating the carriage of insecticides and other toxic chemicals in such a way as to prevent the contamination of foodstuffs and similar substances during transport; both the World Health Organization and the Inter-Governmental Maritime Consultative Organization are working towards the establishment of regulations and practices to that end.

SMALLPOX SURVEILLANCE

WHO Wkly Epid Record 43(23): 291, June 7, 1968.

Through 28 May, a total of 22,040 cases of smallpox were reported to WHO as having occurred during 1968; whereas a total of 48,429 cases were reported during comparable periods in 1967. However, delayed reports may be expected to increase the provisional total thus far noted during 1968.

In the countries of Western and Central Africa, the incidence of smallpox in 1968, despite improved reporting, has declined by over 40%. Eradication programs began in most of these countries during 1967. Significant increases in incidence are observed only in Togo and Sierra Leone, the latter country only recently having begun its program.

The Eastern and Southern African countries have little change in the overall disease incidence. Eradication programs in most of these countries are beginning in 1968. Sudan, which recorded only 7 cases in 1967, all of which resulted from importations, has recently experienced outbreaks in Upper Nile and Kassala Provinces. Emergency mass vaccination programs have been initiated.

In Asia, both India and West Pakistan have recorded far fewer cases than in 1967 while Indonesia and East Pakistan have recorded substantial increases. These contrasts in recorded smallpox incidence must be interpreted cautiously in view of the fact that eradication programs in Indonesia and East Pakistan are significantly more advanced than in the other 2 areas. As frequently noted, the development of programs is often accompanied by improved reporting.

MALARIA SURVEILLANCE

USDHEW PHS NCDC, Malaria Surveillance, 1967 Ann Rep 2-9, 1968.

Epidemiologic reports on 2,815 cases of malaria with onset of illness in 1967 in the United States and Puerto Rico were received by the Malaria Surveillance Unit of the National Communicable Disease Center, Atlanta, Georgia. This is the largest number of malaria cases recorded in the United States for any year since 1952. Military personnel (including recently discharged veterans) accounted for 2,669 cases, and 146 additional cases were reported in civilians. From 1956-1965, an average of only 108 cases per year were reported, which rose to 678 cases in 1966, and 2,815 cases in 1967. Military cases have increased markedly since 1965, whereas civilian cases have increased only slightly. Only 7 of the 2,815 cases in 1967 acquired their infection in the United States.

The Plasmodium species was identified in 2,735 of the 2,815 cases (97.2%). *P. vivax* accounted for 81% of the infections; *P. falciparum* was only 13%. Corresponding figures for 1966 were 56% and 33%, respectively. *P. ovale* accounted for 18 cases in 1967, while 19 infections were due to *P. malariae*. This compares with 13 cases of *P. ovale* and 12 cases of *P. malariae* in 1966.

In total, 1,323 of the 2,808 imported cases gave a history of malaria while abroad (47.1%); 1,353 cases had no such history (48.2%); and in 132 cases no information about previous malaria was available.

Two categories, former Peace Corps Volunteers and foreign visitors to the United States, accounted for 48% of the 146 civilian cases:

a. Twenty-one cases occurred in former Peace Corps Volunteers as compared with 30 in 1966, 17 in 1965, and 5 in 1964. All but 2 of these 21 individuals had been stationed in West Africa. *P. vivax* was the etiologic agent in 12 cases, *P. ovale* in 7 cases, and in 2 cases the parasite species was not identified.

b. Forty-nine malaria cases were reported in foreign visitors to the United States. This compares with 30 such cases in 1966 and 19 in 1965. Of these 49 cases, 17 were students and 12 were merchant seamen.

Most infections (2,629) were acquired in Vietnam. Of the other countries where malaria was acquired, Pakistan accounted for 24 infections as compared with 9 cases in 1966 and 10 cases in 1965.

No notable increase of cases was observed from other malarious areas. Seventeen *vivax* infections were reportedly acquired in West Africa.

Onset of illness occurred more than 30 days after arrival in the United States in 80% of the 2,563 cases for which both date of onset and date of arrival in this country are known. A marked difference was observed between *vivax* and *falciparum* malaria; 56% of the *falciparum* cases became ill within 1 month after arrival, as compared with only 15% of the *vivax* cases. Twenty-six cases experienced their first symptom more than 1 year after return to the United States: 25 of the these were due to *P. vivax,* while *P. falciparum* was diagnosed in 1 case. The time interval between arrival in the United States and onset of illness in the 25 *vivax* cases varied from 12 to 36 months. The *falciparum* case became ill 404 days after his arrival.

Primaquine therapy was reported to have been administered to 1,499 of the *vivax* cases which occurred in 1967, while no primaquine was given to 600 *vivax* cases. The relapse rate was 10.1% for cases who received primaquine and 21.2% for cases who did not receive primaquine.

Malaria Imported From Vietnam

Infections acquired in Vietnam accounted for 2,629 of the 2,808 imported cases (93.6%). Only 6 of these 2,629 cases did not occur in military personnel. *P. vivax* was the etiologic agent in 2,175 of the 2,629 cases (82.7%), *P. falciparum* in 329 cases (12.5%), *P. malariae* in 12 cases (0.5%), and *P. ovale* was found in only 1 case. Forty-four cases had a mixed infection (1.7%), and in 68 cases the Plasmodium species was not identified (2.6%). From information available, 48% had a history of malaria while in Vietnam. Army personnel accounted for 93% of the military cases who became infected in Vietnam while 3% of the cases occurred in personnel of the Marine Corps. Navy and Air Force personnel represented less than 1% of the cases.

Of the 2,175 military returnees from Vietnam who developed *vivax* malaria in the United States in 1967, 295 had one or more relapses, i.e. a relapse rate of 13.7%; corresponding rate for 1966 was 28.9%. The relapse rate for *falciparum* infections in military personnel returning from Vietnam in 1967 was 5.1% as compared to 8.6% in 1966.

SALMONELLA CONTAMINATION OF ENZYMATIC DRAIN CLEANERS

USDHEW PHS NCDC Morb & Mort Wkly Rep 17(18), wk ending May 4, 1968.

Enzymatic drain cleaners are products containing dried enzyme preparations, desiccated bacterial cultures, and dry fillers or carriers. These products are used to decongest and to clean drains, septic tanks, grease pits, waste ponds, dishwashers, potato peelers, wash sinks, and other kitchen and bathroom equipment. They are recommended for use in schools, hospitals, sanitariums, hotels, creameries, and food processing plants, and are claimed to be nonpathogenic.

The Chicago Board of Health, in the autumn of 1967, reported the isolation of salmonellae from an enzymatic drain cleaner; this finding was confirmed by the Epidemiological Services Laboratory Section, NCDC. Early in 1968, the Connecticut State Department of Health notified the Salmonellosis Unit, NCDC, Atlanta, that it had isolated 6 salmonella serotypes from another brand of enzymatic drain cleaner. To determine the extent and source of salmonella contamination of these products, the Consumer and Marketing Service, U.S. Department of Agriculture and the Epidemiological Services Laboratory, NCDC, performed bacteriologic examinations on samples of drain cleaners.

The USDA survey included 68 samples of enzymatic cleaners from 28 firms. Of the 68 samples, 26 (38%) contained salmonellae. The 26 positive samples represented 9 different firms; 19 firms had products that did not yield salmonellae. Salmonella O groups from positive samples included B, C, C_1, C_2, E_1, E_2, E_4, and G. Some of the enzymatic cleaners included in the survey were from reserve samples that had been stored at the USDA laboratory for as long as 2 years. Positive samples obtained from these stored products indicate the viability of salmonella in these compounds when stored at ambient temperatures.

The Epidemiological Services Laboratory examined both the finished product and constituent ingredients of the drain cleaner previously found to contain salmonella by the Connecticut State Department of Health. Twelve samples of the products and samples of 11 different constituents were provided by the U.S. Food and Drug Administration. All 12 of the product samples examined were found to contain salmonellae, yielding a total of 7 serotypes. Only 2 of the constituent ingredients, cellulase

and lipase, were found to contain salmonellae. Both enzyme preparations had been manufactured by the same firm. The serotypes found in the drain cleaner were *Salmonella california, S. infantis, S. lexington, S. meleagridis, S. montevideo, S. oranienburg,* and *S. senftenberg*. The cellulase was positive for *S. california, S. montevideo,* and *S. senftenberg,* and the lipase for *S. california, S. lexington,* and *S. montevideo*. Constituent ingredients found negative for salmonellae included bacterial mix, anhydrous disodium phosphate, propylene oxide, propylene glycol, sodium thiosulphate, protease, amylase, urea, and nitrilio sodium acetate.

Although these studies show salmonella contamination of enzymatic drain cleaners, to date, no cases of salmonellosis attributable to enzymatic drain cleaners have been documented.

Editor's Note: As a result of the USDA survey, a policy concerning use of enzymatic cleaners in federally inspected meat and poultry establishments was adopted by the Technical Services Division, Consumer and Marketing Service, USDA. A copy of this policy may be obtained on request from: Laboratory Branch, Technical Services Division, Consumer and Marketing Service, USDA, P.O. Box 348, Beltsville, Maryland 20705.

GONORRHEAL URETHRITIS IN MEN TREATED WITH ONE ORAL DOSE OF METHACYCLINE

David G. McLone, et al., USDHEW PHS Public Health Rep 83(1):87–89, Jan 1968.

Substitution of various groups on the basic tetracycline molecule has resulted in a family of antibiotics with varying pharmacological activities. Methacycline (6-methylene oxytetracycline) is effective against a wide range of bacterial infections. Methacycline has an inhibitory concentration for *Neisseria gonorrhoeae* equivalent to that of tetracycline. It is readily absorbed from the gastrointestinal tract. It reaches a maximum concentration at about the 4th hour and declines to a negligible amount in about 24 hours. Methacycline has essentially the same spectrum of antimicrobial activity as the other tetracycline derivatives but is more potent.

Marmell, et al. and Morton and Higson have established the effectiveness of methacycline in the treatment of gonorrhea. However, their studies employed regimens requiring multiple oral doses. Oral medication for treating gonorrhea is desirable because painful injections are eliminated, there is no need for large number of syringes, and a large clinic load can be readily handled. One-dose therapy, given in a clinic, is desirable because patients frequently do not complete a longer course of oral, self-administered therapy.

The need to test new antibiotics for treating gonorrhea is dictated by the waning efficacy of penicillin. While penicillin remains the preferred treatment, the dosage has escalated in 20 years from 300,000 units of long-acting forms to 2,400,000 units of short-acting penicillin. An increasing percentage of the population is now found to be hypersensitive to penicillin and requires treatment with alternate antibiotics.

Trials of newer drugs are essential to establish the best alternate to penicillin and to indicate which therapy may be the first choice in the future.

Materials and Methods

Men coming for treatment of urethral discharge were selected on the basis of having a urethral exudate which on stained smear demonstrated typical intracellular diplococci. Ages ranged from 14 to 53 years. This study involved 289 men and was conducted between 1 January 1967 and 30 March 1967.

Exudates from patients with positive smears were collected by intraurethral scraping with a 2-mm platinum wire loop and was immediately inoculated on culture plates of Thayer-Martin selective medium. Presumptive identification of *N. gonorrhoeae* was made on the basis of typical colonial morphology, oxidase reaction, and gram stain. Sugar fermentation studies were not routinely carried out. The Thayer-Martin culture was negative for only 24 of 289 patients who had a positive stain smear. The 24 negative cultures may indicate nongonococcal urethritis or failures in culturing technique.

Routine serologic tests for syphilis were done for all patients, and each patient was examined for evidence of primary or secondary syphilis.

The first 97 patients received 600 mg methacycline, the second 95 patients 900 mg and the next 97 patients 1.2 gms. Patients returned in 24 hours, but were included in the study if they returned within 96 hours. Patients returning with signs and symptoms more than 96 hours after the initial visit were presumed to be reinfected. At follow-up, smears were made if exudate was present and intraurethral scraping for culture were taken from all patients. All patients returned if symptoms recurred. None of the persons treated were retreated at the first follow-up visit.

Emesis appeared to be a problem for the first few patients treated. Thus, each group was divided in half; ½ was instructed to take methacycline with their next meal and the second ½ was told to take the methacycline immediately, regardless of the period of time since the last or before the next meal. Many persons in the second half of each group were fasting. The purpose was to determine if a meal influenced either the emesis or the cure rate.

Results

The results achieved with the various dosages are summarized in table 1. All patients were instructed to return if signs or symptoms recurred. Between 96 hours and 2 weeks, 34 patients had positive cultures; 12 of these had received a 600-mg dose, 15 a 900-mg dose, and 7 a 1,200-mg dose.

No relationship between age, race, number of previous infections, or duration of symptoms and failure of the treatment was found in the patients who returned with clinical evidence of gonorrhea within 2 weeks of treatment. No case of concomitant syphilis were noted.

In this study, only 1 of the 19 failures was married. In previous study, the number of persons in the failure group who were married was greater than expected.

Discussion

In this study, the criteria for diagnosis were clinical signs and symptoms of gonorrhea, positive smear of urethral exudate, positive culture of urethral exudate. The criteria for cure were disappearance of signs and symptoms, negative urethral smear if exudate was present, and negative culture of urethral exudate within 96 hours post-treatment.

If the patient returned within 4 days of treatment and had a positive urethral smear, he was classified in the failure group since reinfection can be considered negligible in this period. Using the Thayer-Martin medium on follow-up, 19 patients had a posi-

TABLE 1.—*Results With Various Doses of Methacycline to treat Gonorrhea, 1 Jan–30 Mar 1967*

Dose	Positive smear	Positive culture	Number of patients with: Positive culture and follow-up	Number of patients with: Positive culture 96 hours	Percent failure
600 mg	97	91	68	10	14.7
900 mg	95	88	54	7	12.9
1,200 mg	97	86	55	2	3.6

TABLE 2.—*Effect of Taking Methacycline to Treat Gonorrhea With and Without Meals, By Size of Dose, 1 Jan–30 Mar 1967*

Dose and when taken	Patients with positive culture and follow-up	Patients with positive culture within 96 hours	Emesis
600 mg:			
With meal	46	3	2
Without meal	45	7	2
900 mg:			
With meal	45	3	4
Without meal	43	4	0
1,200 mg:			
With meal	40	0	1
Without meal	46	2	4

tive culture. This method assumes that all positive smears after 4 days are the result of reinfections. The calculated cure rate among those who did return was 96.4% for those receiving 1.2 gms of methacycline.

The rate of emesis with methacycline is independent of dosage and not related to whether or not methacycline was taken with meals. The overall emesis rate was about 5%. Contrary to what has been noted in other studies involving tetracycline derivatives, taking methacycline with meals did not alter the cure rate. No other adverse reactions were noted with methacycline.

Summary

Clinical evaluation of methacycline in the treatment of gonorrhea was conducted from 1 Jan—30 Mar 1967, at the Fulton County Health Department, Atlanta, Ga. A negative smear and culture were used as the criteria for cure.

One oral dose of 1,200 mg resulted in a cure rate of 96.4%. Age, race, marital status, and taking methacycline with meals did not alter the cure rate.

Based on these findings, methacycline is an acceptable alternative to penicillin in the treatment of gonococcal urethritis in males.

TULAREMIA IN VERMONT

USDHEW PHS CDC Veterinary Public Health Notes, pp 2–3, May 1968.

From 25 March to 20 April 1968, 32 persons suffered an acute febrile illness after trapping or skinning muskrats in Addison and Rutland counties, Vermont. The illness was characterized by headache, epitrochlear and axillary adenopathy, ulcers on the hands, and generalized myalgia.

Sera were obtained from 29 of the 32 persons 2–4 weeks after onset of symptoms. Twenty-two patients had agglutination titers against *Francisella tularensis* of 1:320 or higher, highest being 1:10, 240.

Of the 6 patients, 4 who had 2 serum samples taken at least a week apart, showed rises in titer. Two persons who handled muskrats but were not ill, had titers of 1:320 or higher. Exudate from an ulcer on the hand of 1 patient was positive for *F. tularensis* by fluorescent antibody technique.

Oral tetracycline was given to 17 patients, who improved gradually. Two other patients received streptomycin responded rapidly with lysis of fever and resolution of symptoms. No fatalities occurred. Average interval from first contact with muskrats to onset of symptoms was 6 days, and duration of illness was 1 to 4 weeks.

No animal or human cases of tularemia have previously been reported from Vermont. In the spring 1968, hunters and game officials noticed an increase in the number of muskrats, both dead and alive, in the area.

Persons developing tularemia, had contact with muskrats from 3 streams that flow into Lake Champlain. The occurrence of human cases following exposure to muskrats at the end of winter, when arthropod-borne transmission is unlikely, suggests water-borne transmission. Contamination of water with *F. tularensis* may occur from decomposition of dead diseased wildlife. Thus the muskrats become infected and in turn infect man. This pattern of transmission is well established in many of the Rocky Mountain States. Bacteriologic studies are underway on water specimens, mud, muskrats, rabbits, foxes, turtles, and insects obtained from the area.

KNOW YOUR WORLD

Did You Know?

That in 1966, 3,102 cases of human encephalitis, 455 of which resulted in death were reported in the United States?

The Neurotropic Viral Diseases of the National Communicable Disease Center, Atlanta, Georgia, stated that nearly half of the reported cases were encephalitis of unknown etiology, of which over 60% had no diagnostic laboratory work performed. Of these, 34% were "post-infectious" encephalitis, and 14% were attributable to arthropod-borne viruses.

Activity of arthropod-borne viruses in 1966 centered mainly around 2 major urban outbreaks of St. Louis encephalitis in Texas, with scattered cases of St. Louis encephalitis and Western equine encephalitis occurring throughout the Western States.

California encephalitis appeared in local areas of Minnesota, Wisconsin, and Ohio.[1]

That in 1967, 37 states reported 273 foodborne outbreaks affecting 22,171 persons in USA?

There were 15 associated deaths and 118 secondary cases. Etiology was confirmed in 160 of 273 outbreaks, and in another 71 an unconfirmed agent has been listed. *S. typhi* was cause of 5 outbreaks with 54 cases. Other salmonellae were the cause of most illness and accounted for 12,826 cases in 35 outbreaks. Other etiological agents were: *Clostridium perfringens*—3,493 cases in 29 outbreaks; staphylococcus—1,914 in 55; Shigella 587 in 7; viral hepatitis—196 in 9; enteropathogenic *E. coli*—119 in 4; streptococcus—51 in 5; *Trichinella spiralis*—47 in 42; and other parasites 5 in 1; chemical agents—32 in 6; brucella—23 in 22; *Clostridium botulinum*—6 in 3; miscellaneous—328 in 8. Beef and Pork were the most common vehicles in the outbreaks, followed by milk, turkey and other poultry, and fish. Ninety-four occurred at home—323 persons; 25 at banquets with 11,373 affected; contaminated food served at schools was responsible for 35 outbreaks with 4,129 cases, and that served at restaurants for 69 outbreaks with 1,396 cases.[2]

That relapsing fever developed in 11 of 42 persons in 3 groups of Boy Scouts and their leaders who had camped on a mountain about 7 miles from Spokane, Washington, in March 1968?

The mountain has an elevation of 3,000 feet. The illness was characterized by fever greater than 103° F, severe headache, prostration and myalgias, which occurred 3 to 9 days after the camp out; no rashes were noted. The initial period of fever lasted from 3 to 6 days and was followed by 1 to 3 relapses. Laboratory investigation identified typical spirochetes on a Wright stained blood smear from 1 patient during his second relapse. Thirteen ticks of the genus Ornithodoros were collected from rodent nests and the rotting walls of the cabins in the camp site; 2 have been found infected with *Borrelia* by feeding experiments.[3]

That a new Florida State Law, passed by the 1967 Legislature, requires that all milk sold in the State of Florida be pasteurized?

This is to protect the public from bovine tuberculosis.[4]

That an epizootic of rabies in foxes was reported from Kotzebue, Alaska, in February 1968?

For a number of years, rabies has been endemic in the fox population in interior and Arctic Alaska, and often reaches epizootic proportions, creating a health hazard for natives and their sled-dogs. In 1967, the NCDC Atlanta, received a total of 38 animal specimens from the Arctic Health Research Laboratory for examination: 5 were positive for rabies; 2 by fluorescent antibody tests, and 2 by mouse inoculation; in 1 salivary glands were positive. All positive specimens were from foxes. From 1 Jan through 30 April 1968, 66 specimens were examined, of the 27 positive, 23 were from foxes; 3 from dogs; and 1 from an unidentified animal.[5]

That larvae of *Aedes aegypti* have been discovered in the localities of Puerto Cortés and San Pedro Sula, on the Atlantic coast of Honduras?

The extent of the reinfestation is not yet known.[6]

That a fatal case of yellow fever has been confirmed by histopathological examination?

The case occurred on 28 March 1968 in the locality of El Cairo of Warnes Province, 29 kilometers north of the city of Santa Cruz, Bolivia. The population has been vaccinated and no further cases have been reported.[7]

That one-shot vaccination against measles began in May for all British children aged 1 to 15 years who have not had the disease?

Only live attenuated vaccine will be used at a cost of $2.4 million during the first year.[8]

References

1. USDHEW PHS NCDC "Neurotropic Viral Dis Surv" Apr 1968.
2. PANSABU WHO Wkly Epid Rep XL(25):142, 19 June 1968.
3. PANSABU WHO Wkly Epid Rep XL(25):142, 19 June 1968.
4. Florida State Bd of Hlth, "Florida Hlth Notes" 60(6):143.
5. USDHEW PHS CDC Veterinary Public Hlth Notes, p 1, May 1968.
6. PANSABU WHO Wkly Epid Rep XL(24):131, 12 June 1968.
7. PANSABU WHO Wkly Epid Rep XL(19):103, 8 May 1968.
8. Medical World News 9(14):13, 5 Apr 1968.

EDITOR'S SECTION

DEPARTMENT OF DEFENSE INSTRUCTION

Subject: Service Obligation for Military Medical Interns and Residents

References: (a) DoD Instruction 6000.2, "Medical Internship and Residency Training Policy," January 2, 1958 (hereby cancelled)

(b) DoD Directive 1340.8, "Continuation Pay for Medical Corps Officers," December 28, 1967

(c) Military Selective Service Act of 1967, as amended, (50 U.S.C. App. 451–473)

I. Reissuance and Purpose

This Instruction reissues reference (a) in order to prescribe Department of Defense policies regarding service obligations for Medical Corps officers of the Army, Navy and Air Force who undergo military intern or residency training and to clarify the relationship between such obligations and those incurred under reference (b). Reference (a) is hereby cancelled.

II. Applicability

The provisions of this Instruction apply to the Military Departments.

III. Policy

In the interest of obtaining maximum uniformity with respect to the periods of active duty that Medical Corps officers of the Army, Navy and Air Force incur through participation in the military internship and residency training programs of the Armed Forces the following policies are established:

A. *Interns*

1. An applicant for a military internship in a military hospital who has a service obligation under reference (c) shall be required to volunteer for and agree to serve on active duty for three years (including his period of internship); an applicant who does not have such an obligation shall be required to serve on active duty only for the period of internship.

2. An applicant for a military internship in a civilian hospital who has a service obligation under reference (c) shall be required to volunteer for and agree to serve on active duty for a period of three years (including his internship); an applicant who does not have such an obligation shall be required to serve on active duty for two years (including his period of internship).

B. *Residents*

1. An applicant for a military residency in a military hospital shall be required to volunteer for and agree to serve on active duty for a period of one additional year for each year of residency training received.

2. An applicant for courses or a military residency in a civilian school or hospital shall be required to volunteer for and agree to serve on active duty for the applicable period specified below:

Length of Course or Residency	Amount of Additional Service
less than 6 months	2 months for each month of training
6 months to 1 year	2 years
2 years or more	an amount equal to the number of years of training, plus one year

C. *Separate Obligations.* The periods of active duty for which a Medical Corps officer has volunteered under intern and residency training programs may not be served concurrently. However, a period of obligated service following a military internship may be interrupted in order to undergo residency training.

D. *Maximum Period of Obligated Service.* Notwithstanding any other provisions of this Instruction, a period of service agreed to under its provisions shall not extend beyond the date a Medical Corps officer completes eight years of active duty if such an officer executes an obligation for additional service under the provisions of reference (b) that is at least one year greater than his remaining period of obligated service under this Instruction.

E. *Release from Active Duty.* A resignation or request for retirement or release from active duty received from an officer who is performing a period of obligated service under this Instruction will not be favorably considered, except for the convenience of the Government.

IV. Implementation and Effective Date

This Instruction is effective immediately. Two copies of the implementing instructions shall be forwarded to the Assistant Secretary of Defense (Manpower and Reserve Affairs) within 60 days.

CARDIOPULMONARY DISEASE ADVISORY COMMITTEE

The newly-established National Heart Institute Cardiopulmonary Disease Advisory Committee held its first meeting June 3, Dr. Theodore Cooper, Director of the National Heart Institute announced.

The Committee was formed to advise the National Heart Institute and the National Advisory Heart Council on research and training opportunities in the cardiopulmonary disease area. It will evaluate the current status of cardiopulmonary research, attempt to identifiy specific roadblocks to further progress, and assess manpower needs. The Committee is chaired by Dr. Robert E. Forster of the University of Pennsylvania.

The study of respiratory and pulmonary diseases represents an important segment of National Heart Institute research programs. In recent years the concept of the heart and lungs as a single cardiopulmonary system has gained widespread and deserved acceptance. Despite significant research advances, the incidence of chronic cardiopulmonary diseases continues to increase at a rapid rate and the shortage of well-trained physician-scientists in this area has become critical. In addition to the Heart Institute's program in the cardiopulmonary diseases, the National Institute of Allergy and Infectious Diseases has a program which deals with the role of allergic, immunologic and infectious factors in emphysema.

Nearly 25,000 people die from emphysema and bronchitis yearly. These afflictions are also alarming when viewed from aspects other than death rates. At least two million Americans, and possibly as many as 14 million, are estimated to have chronic obstructive respiratory diseases, emphysema, chronic bronchitis, or other cardiopulmonary diseases. More than 20,000 become completely disabled by emphysema yearly.

Ninety million dollars is paid out yearly in Social Security disability benefits to support victims of chronic obstructing respiratory diseases. Emphysema strikes men about seven times more frequently than women. In terms of Social Security pensions, it ranks second only to heart disease as a crippler of men in their most productive working years.—NIH, Bethesda, Md.

THE MILITARY MEDICAL OFFICER TODAY

. . . "there exists in the minds of many, perhaps the majority, of line officers, a very imperfect conception of the position of Medical officers, and the objects for which a Medical Staff was instituted. It is a popular delusion that the highest duties of Medical officers are performed in prescribing a drug or amputating a limb; and the troops frequently feel the ill effect of this obsolete idea, and are often unnecessarily broken down in health and compelled to endure suffering which would have been avoided did commanders take a comprehensive view of this important subject. It is a matter of surprise that such a prejudice should exist in this enlightened age, particularly among highly intelligent men; and it were well if commanding officers would disabuse (clear) their minds of it, and permit our armies to profit more fully by the beneficial advice of those who, for years, have made the laws of life a study, and who are therefore best able to counteract the influences which so constantly tend to undermine the health of an army and destroy its efficiency. A corps of Medical officers was not established solely for the purpose of attending the wounded and sick; the proper treatment of these sufferers is certainly a matter of very great importance, and is an imperative duty, but the labors of Medical officers cover a more extended field. The leading idea, which should be constantly kept in view, is to strengthen the hands of the Commanding General by keeping his army in the most vigorous health, thus rendering it, in the highest degree, efficient for enduring fatique and privation, and for fighting. In this view, the duties of such a corps are of vital importance to the success of an army, and commanders seldom appreciate the full effect of their proper fulfillment. Medical officers should possess a thorough knowledge of the powers, wants, and capabilities of the human system, the effect of food, raiment, and climate, with all its multiplied vicissitudes, the influences for evil which surrounds the health of an army, and the means necessary to combat them successfully. They should also possess quickness of perception, a sound judgment promptness in action, and skill in the treatment of medical and surgical diseases. It is the interest of the Government, aside from all motives of humanity, to bestow the greatest possible care upon its wounded and sick, and to use every means to preserve the health of those who are well, since the greater the labor given to the preservation of health, the greater will be the number for duty, and the more attention bestowed upon the sick and wounded, the more speedily will they perform the duties for which they were employed, or be discharged from a service which they can no longer benefit."—Medical Recollections of the Army of the Potomac," Johnathan Letterman, published by D. Appelton and Company, New York.

DEPARTMENT OF THE NAVY

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